**Math CSO General Resources**

EXCELENT LINK TO GRADES K-12 MATH WEBSITES: contains math interactive, search by subject, libraries of interactives, ELEMENTARY: Basic numbers, addition, subtraction, decimals, division, estimating, exponents, fractions, geometry, measurement, Microsoft Excel, money, multiplication, perimeter and area, place value, Roman numerals, rounding, time, interactive word problems. SECONDARY: algebra, data/statistics/graphs, distance/time/rate, geometry, trigonometry/calculus. <http://wvschools.com/harrisoncounty/links/ma.htm>

Good Resources for all math grade levels (PK-12)

<http://mathslice.com/ms_hs_main.php>

Good Resources for all math grade levels (K-12)

<http://nlvm.usu.edu/en/nav/vLibrary.html>

Good Resources for all math levels (K-12)

<http://www.techteachers.com/mathweb/integratingmath.htm>

Good Manipulatives (Grades K-2)

<http://www.eduplace.com/kids/mw/manip/mn_k.html>

Virtual Library of Manipulatives (Grades K-2)

<http://nlvm.usu.edu/en/nav/grade_g_1.html>

Kid’s Count Good Resources for Math and RLA (Grades K-1)

<http://kidscount1234.com/>

***Kindergarten Math Resources***

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| **Grade K** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.K.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.K.1.1** | **count forward to 20 and backward from 10 with and without manipulatives.**  Number Sense in Kindergarten  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=100&tsele3i=71>  Count to 100 (Fill in missing numbers)  <http://www.hbschool.com/activity/count/index.html>  Ten Frame  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=75>  AAA Math (Scroll down to game)  <http://www.aaamath.com/k2a-count.html>  Number of the Day  <http://pbskids.org/sesame/> |
| **M.O.K.1.2** | **read, write, order, and compare numbers to 20 using multiple strategies (e.g. manipulatives, number line).**  Number Sense in Kindergarten  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=100&tsele3i=71>  The Number Game  <http://www.primarygames.com/Number%20Game/question_1.htm>  Names of Numbers  <http://www.aaamath.com/B/k2d_cox1.htm>  Count Us In  <http://www.abc.net.au/countusin/games/game6.htm>  Matching Game  <http://www.literacycenter.net/numbers_en/num_conc_en.asp>  Number Word Matching  <http://www.quia.com/mc/82401.html> |
| **M.O.K.1.3** | **group and count manipulatives by ones, fives, and tens.**  Skip Counting Game Ideas  <http://www.mathdynamics.com/skip_counting.htm>  Quia Skip Counting (2’s, 5’s 10’s)  <http://www.quia.com/rr/98593.html>  Skip Counting with Skip a Roo  <http://www.rblewis.net/technology/EDU506/WebQuests/skpcount/skpcount.html> |
| **M.O.K.1.4** | **model and identify place value of each digit utilizing standard and expanded form through 20.**  Make a Really Big Number (up to 1,000’s)  <http://pbskids.org/readingrainbow/games/make_number.html> |
| **M.O.K.1.5** | **Use ordinal numbers 1st – 10th to identify position in a sequence.**  Count Us In (Ordinal Number Ideas)  <http://www.abc.net.au/countusin/resources/episode-04.htm>  Ordinal Numbers (Information and Practice Pages)  <http://www.studyzone.org/testprep/math4/a/ordinall.cfm>  The Cats in Line  <http://www.janbrett.com/piggybacks/ordinal.htm>  AAA Math Ordinal Numbers  <http://www.321know.com/g15_orx1.htm> |
| **M.O.K.1.6** | **estimate the number of objects in a group of 20 or less and count to evaluate reasonableness of estimation.**  Count Your Chickens  <http://www.learningplanet.com/sam/cyc/index.asp> |
| **M.O.K.1.7** | **identify and name halves and wholes using concrete models.**  Parts to a Whole  <http://mathforum.org/varnelle/knum3.html>  Parts of a Whole  <http://nlvm.usu.edu/en/nav/frames_asid_102_g_2_t_1.html>  Divide and Shade  <http://mathforum.org/varnelle/knum2.html>  Count Us In  <http://www.abc.net.au/countusin/resources/episode-13.htm> |
| **M.O.K.1.8** | **use concrete objects to model addition and subtraction of whole numbers related to sums of 10 or less and write corresponding number sentence.**  Operations in Kindergarten  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=100&tsele3i=136> |
| **M.O.K.1.9** | **model meanings of operations and the relationship between addition and subtraction (e.g., identity element of addition, commutative property) using manipulatives.**  Operations in Kindergarten  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=100&tsele3i=136> |
| **M.O.K.1.10** | **create grade-appropriate picture and story problems, solve using a variety of strategies, present solutions and justify results.**  Operations in Kindergarten  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=100&tsele3i=136> |
| **Grade K** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.K.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.K.2.1** | **justify the classification of self-selected objects based on attributes.**  Count Us In  <http://www.abc.net.au/countusin/games/game9.htm>  Attribute Blocks  <http://matti.usu.edu/mathforum/attributeblocks.html> |
| **M.O.K.2.2** | **create, describe, and extend a repeating pattern using common objects, sound, and movement.**  Patterns in Kindergarten  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=100&tsele3i=130>  Funschool: Patterns  <http://interstitials.kaboose.com/funschool/sprint-2008.html?url=http%3A//funschool.kaboose.com/preschool/games/game_crazy_pattern_machine_the.html>  Check Out Cookie  <http://www.sesamestreet.org/game_player?p_p_lifecycle=0&p_p_id=gamePlayer_WAR_sesameportlets4369&p_p_uid=7380c2a5-163c-11dd-98c7-b9f43dcf5330>  Saxon Math: Patterning What Comes Next?  <http://www.haelmedia.com/html/mc_mk_002.html>  BeadString Patterns  <http://www.kented.org.uk/ngfl/games/beads.html>  What Comes Next?  <http://www.little-g.com/games/patterns.html>  Music Patterns  <http://www.harcourtschool.com/activity/pattern/pattern.html>  Exploring Patterns Video (Interactive)  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/5_Patterns/index.html> |
| **M.O.K.2.3** | **model and identify patterns of counting by 5’s and 10’s.**  Interactive Color Chart (Scroll down)  <http://www.apples4theteacher.com/math/games/100-number-chart-one.html>  AAA Math Counting by Fives  <http://www.aaaknow.com/k4a_cox1.htm>  AAA Math Counting by Tens  <http://www.321know.com/g13a1_x1.htm>  Skip Counting (2’s, 5’s, 10’s)  <http://www.ixl.com/math/practice/kindergarten-skip-count-by-twos-fives-tens> |
| **Grade K** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.K.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.K.3.1** | **use physical materials to construct, identify, and classify basic geometric plane shapes:**   * **circles** * **ellipses (oval)** * **rectangles including squares** * **triangles**   Geometric Shapes Unit  <http://boe.brax.k12.wv.us/TeacherLeadershipInstituteUnitPlans/unitplanrt.rtf>. |
| **M.O.K.3.2** | **recognize and describe basic geometric shapes in the environment.**  Geometric Shapes (Lesson Plan)  <http://www.iit.edu/~smile/ma8714.html>  Geometric Shapes Unit  <http://boe.brax.k12.wv.us/TeacherLeadershipInstituteUnitPlans/unitplanrt.rtf> |
| **M.O.K.3.3** | **model and describe spatial relationships:**   * **inside/outside** * **top/bottom** * **before/after**   Spatial Concepts  <http://www.meddybemps.com/9.600.html> |
| **M.O.K.3.4** | **identify the separate parts used to make a whole object.**  Ready? Set? Let’s Dough! It’s a Matter of System (Lesson Plan)  <http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=4&DocID=170>  Everything Has Parts (Lesson Plan)  <http://ims.ode.state.oh.us/ODE/IMS/Lessons/Content/CSC_LP_S03_BA_LPK_I01_01.pdf>  Fractions: Parts of a Whole (interactive)  <http://nlvm.usu.edu/en/nav/frames_asid_102_g_1_t_1.html> |
| **Grade K** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.K.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.K.4.1** | **estimate the size of an object and compare and order objects with respect to a given attribute.**  Making Estimations in Measurement (Lesson Plan: Grade 1: Adaptable)  <http://mathforum.org/paths/measurement/makestimate.html> |
| **M.O.K.4.2** | **use standard and nonstandard units of measure to find the length of an object.**  Measuring Teddy  <http://www.apples4theteacher.com/measure.html>  Non Standard Measuring (Lesson Plan: Grade 1: Adaptable)  <http://mathforum.org/paths/measurement/nonstand.html>  How Many Steps?  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L187> |
| **M.O.K.4.3** | **compare two objects in nonstandard units of measure, according to one or more of the following attributes:**   * **length** * **height** * **weight**   How Many Steps?  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L187> |
| **M.O.K.4.4** | **use calendar to identify date and the sequence of days of the week.**  Just in Time (Locate current year and use calendar)  <http://www.fi.edu/time/Journey/JustInTime/calendar/calendar1.html>  Enchanted Learning (Scroll down to calendars)  <http://www.enchantedlearning.com/themes/calendar.shtml> |
| **M.O.K.4.5** | **read time to the hour using analog and digital clocks.**  Identifying Time to the Hour  <http://www.kidsolr.com/earlychildhood/page4.html>  Telling Time (Choose level 1 for hour)  <http://www.createareader.com/RSClient/RSClient.swf?taa=CAR&tln=12&signInAs=basicguest&rt=http://www.create-areader.com/Components/CARPage.swf&site=basic&lang=English&page=Activities&foo=v>  Clockwise (Choose level 1)  <http://www.bbc.co.uk/education/dynamo/den/clock/index.htm> |
| **M.O.K.4.6** | **identify the name and value of coins and explain the relationships between:**   * **penny** * **nickel** * **dime**   Identify Pennies and Dimes  <http://www.haelmedia.com/html/sg_mk_001.html>  Coins for Candy (Pennies, nickels, dimes)  <http://www.beaconlearningcenter.com/WebLessons/CoinsForCandy/money001.htm>  Money  <http://webs.morton709.org/elementary/k/math/web-based-projects/Money%20Project%20Web.htm> |
| **Grade K** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.K.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.K.5.1** | **collect, organize, display, and interpret data using a pictograph and bar graph (with and without technology).**  Counting Objects  <http://www.harcourtschool.com/activity/counting_objects/>  Bar Chart  <http://nlvm.usu.edu/en/nav/frames_asid_190_g_1_t_1.html> |
| **M.O.K.5.2** | **conduct a simple probability experiment and use tallies to record results in a table, make predictions based on results.**  NLVM Spinners  <http://nlvm.usu.edu/en/nav/frames_asid_186_g_1_t_5.html?open=activities&from=category_g_1_t_5.html> |

**1st Grade Math Resources**

**Kid’s Count Good Resources for Math and RLA (Grades K-1)**

<http://kidscount1234.com/>

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| **Grade 1** | **Mathematic** |
| **Standard 1** | **Number and Operations** |
| **M.S.1.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.1.1.1** | **count forward to 100 and backward from 20 with and without manipulatives.**  Numeration  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=86>  Count Along to 100  <http://www.hbschool.com/activity/count/index.html>  Count Along to 100 (Fill in the Missing Numbers)  <http://www.hbschool.com/activity/count/index.html>  Mend the Number Square  <http://www.bbc.co.uk/schools/numbertime/games/mend.shtml> |
| **M.O.1.1.2** | **read, write, order, and compare numbers to 100 using multiple strategies (e.g. manipulatives, number line, symbols).**  Numeration  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=86>  Caterpillar Ordering  <http://www.wmnet.org.uk/resources/gordon/Caterpillar%20ordering%20v3.swf>  Compare It  <http://mrsbogucki.com/aemes/resource/apps/compare/default.htm>  Compare Numbers  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=ncmenu>  The Less than Lake Maze  <http://www.mathsyear2000.co.uk/magnet/minus3/hopscotch/index.html>  The More than Marsh Maze  <http://www.mathsyear2000.co.uk/magnet/minus3/hopscotch/more1.html>  Really Big Numbers  <http://www.mathcats.com/explore/reallybignumbers.html>  Word Game  <http://www.sums.co.uk/playground/n2a/playground.htm> |
| **M.O.1.1.3** | **identify odd and even numbers to 20 and determine if a set of objects has an odd or even number of elements.**  Number Patterns  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=253>  Even Odd Numbers  <http://membres.distributel.net/~skipper/mathart/info.html>  Ghost Blaster (Odd)  <http://www.oswego.org/ocsd-web/games/GhostblastersOdd/ghostodd.html>  Ghost Blaster (Even)  <http://www.oswego.org/ocsd-web/games/Ghostblasterseven/ghosteven.html> |
| **M.O.1.1.4** | **group and count manipulatives by ones, fives, and tens to 100.**  Number Patterns  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=253>  Place Value Game (To thousands)  <http://www.toonuniversity.com/flash.asp?err=496&engine=5>  Shark Pool Place Value  <http://www.ictgames.com/sharknumbers.html>  Counting by Fives  <http://www.aaamath.com/B/g13c1_x1.htm>  Counting by Tens  <http://www.aaamath.com/B/g13a1_x1.htm>  Fairy Fog (Count by 2’s, 5’s, 10’s, 100’s)  <http://www.ictgames.com/fairyfog.html> |
| **M.O.1.1.5** | **model and identify place value of each digit utilizing standard and expanded form to 100.**  Numeration  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=86>  Place Value  <http://www.aaamath.com/B/g12b_px1.htm>  Chip Abacus  <http://nlvm.usu.edu/en/nav/frames_asid_209_g_1_t_1.html?open=activities> |
| **M.O.1.1.6** | **round any two-digit number to the nearest 10.**  Number Jumbler  <http://www.bbc.co.uk/schools/starship/maths/games/number_jumbler/small_sound/standard.shtml>  Rounding Matching Game  <http://www.quia.com/mc/325022.html>  Rounding to Nearest Ten Matching  <http://www.grahamwroe.dsl.pipex.com/numeracy/e2/ro10.html> |
| **M.O.1.1.7** | **use ordinal numbers 1st - 20th to identify position in a sequence.**  Find Squigley in the Apple  <http://www.primarygames.com/squigly/start.htm>  Ordinal Numbers  <http://www.aaamath.com/nam15-ordinals.html>  Cats in a Line  <http://www.janbrett.com/piggybacks/ordinal.htm>  Match Cardinal and Ordinal Numbers  <http://www.internet4classrooms.com/skills_1st_math.htm>  Ordinal Balloons  <http://www.abc.net.au/countusin/games/game4.htm> |
| **M.O.1.1.8** | **estimate the number of objects in a group of 100 or less and count to evaluate reasonableness of estimate.**  Estimate  <http://www.oswego.org/ocsd-web/games/Estimate/estimate.html>  Guess the Number  <http://www.amblesideprimary.com/ambleweb/mentalmaths/guessthenumber.html> |
| **M.O.1.1.9** | **identify, name, and explain why a given part is a half, third or fourth of a whole or part of a group, using concrete models.**  Fraction Concentration  <http://www.hbschool.com/activity/con_math/g03c21.dcr>  I Want my Half  <http://www.beaconlearningcenter.com/WebLessons/IWantMyHalf/default.htm>  Percent Paint  <http://www.oswego.org/ocsd-web/games/PercentPaint/ppaint.html>  Shaded Portion  <http://marg.mhost.com/fractions/fractions3.htm>  Fraction Flag (Halves and Quarters)  <http://www.oswego.org/ocsd-web/games/fractionflags/fractionflags.html>  Fraction Flag (Thirds)  <http://www.oswego.org/ocsd-web/games/fractionflags/ffthirds.html>  Fourths  <http://www.aaamath.com/B/fra35ax2.htm> |
| **M.O.1.1.10** | **use concrete objects to model the addition of two or three addends and subtraction of whole numbers related to sums less than 18 and write the corresponding number sentence.**  Operations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=73> |
| **M.O.1.1.11** | **model operations, addition and subtraction, and the relationship between addition and subtraction (e.g., identity element of addition, commutative property, fact families, inverse operations) using concrete objects.**  Operations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=73> |
| **M.O.1.1.12** | **quick recall of basic addition facts with sums to 10 and corresponding subtraction facts.**  Inverse Relation Facts of Addition and Subtraction  <http://www.aaamath.com/B/g210a_x1.htm>  Inverse Relationship of Subtraction and Addition  <http://www.321know.com/g210b_x1.htm> |
| **M.O.1.1.13** | **model and solve 2-digit addition and subtraction without regrouping.**  Adding 2-Digit Numbers  <http://www.dositey.com/addsub/add2basic.html>  Addition Step by Step  <http://www.dositey.com/addsub/add5a.html>  Adding Two-Digit Numbers without Renaming  <http://www.aaamath.com/B/g27_adx4.htm> |
| **M.O.1.1.14** | **create grade-appropriate picture and story problems using a variety of strategies (with and without technology), present solutions and justify results.**  Numeration  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=86>  Operations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=73> |
| **Grade 1** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.1.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.1.2.1** | **sort and classify objects by more than one attribute, using various strategies, including Venn Diagrams.**  Venn Diagram Shape Sorter (Interactive)  <http://www.shodor.org/interactivate/activities/ShapeSorter/> |
| **M.O.1.2.2** | **determine the rule or give the output given an input/output model using addition or subtraction.**  Stop that Creature  <http://pbskids.org/cyberchase/games/functions/functions.html>  Function Machine  <http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html>  Function Machine 2  <http://www.wmnet.org.uk/resources/gordon/Function%20machine%20v3.swf> |
| **M.O.1.2.3** | **identify and write number patterns by 2’s, 5’s, and 10’s.**  Number Patterns  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=253> |
| **M.O.1.2.4** | **create and analyze number patterns based on real-life situations using words, AB form, and T-charts and present results.**  Number Patterns  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=253> |
| **M.O.1.2.5** | **use concrete materials to demonstrate that the quantities on both sides of a grade-appropriate number sentence are equivalent.**  Operations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=73> |
| **Grade 1** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.1.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.1.3.1** | **draw, label, and sort**   * **circle,** * **rectangles including squares,** * **triangles**   **according to sides and vertices.**  Geometric and Spatial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=74> |
| **M.O.1.3.2** | **use physical materials to construct, identify, and classify three-dimensional figures:**   * **cube** * **cone** * **sphere** * **rectangular solid** * **pyramid** * **cylinder**   Geometric and Spatial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=74>  Classify and Compare Solid Shapes  <http://www.eduplace.com/cgibin/schtemplate.cgitemplate=/kids/mw/help/eh_popup.thtml&grade=2&chapter=8&lesson=4&title=Classify+and+Compare+Solid+Shapes&tm=tmfc0804e> |
| **M.O.1.3.3** | **recognize three-dimensional shapes in the environment.**  Geometric and Spatial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=74> |
| **M.O.1.3.4** | **draw and identify**   * **open and closed figures** * **congruent plane shapes**   Is it Open or Closed?  <http://www.learnnc.org/lp/pages/3796>  Congruent Shapes (Printable)  <http://www.teachervision.fen.com/geometric-figures/printable/31795.html>  Mass Learns  <http://www.masslearns.com/link_library.html?subject=NM&sub_cat=50271&final=50274> |
| **M.O.1.3.5** | **create and describe simple symmetrical designs.**  Geometric and Spatial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=74> |
| **M.O.1.3.6** | **describe spatial relationships: over/under, left/right.** |
| **M.O.1.3.7** | **find and name locations on a first-quadrant grid.**  Geometric and Spatial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=74> |
| **M.O.1.3.8** | **predict the result of combining or decomposing two or more two-dimensional/three-dimensional shapes.**  Geometric and Spatial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=74> |
| **Grade 1** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.1.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.1.4.1** | **estimate, measure, compare and order using customary, metric, and nonstandard units to determine length to nearer whole unit.**  Estimate, Measure, Compare (Printable)  <http://www.teachervision.fen.com/measurement/printable/31608.html>  Can You Estimate? (Printable)  <http://www.intel.com/corporate/education/emea/eng/za/elem_sec/tools_resources/plans/measure/lessonplans/Can%20you%20estimate.dot> |
| **M.O.1.4.2** | **select appropriate units and tools to measure and compare two objects or events according to one or more of the following attributes:**  **length**  **height**  **weight**  **temperature**  **volume**  **justify selection of units and tools used to measure the attributes and present results.**  Heaviest to Lightest  <http://www.kidport.com/Grade1/Math/MeasureGeo/G1-M-MG1-1-3.htm>  Poodle Weigh In  <http://pbskids.org/cyberchase/games/algebra/>  Teaching Measures  <http://www.teachingmeasures.co.uk/menu.html> |
| **M.O.1.4.3** | **use calendar to identify date, sequence of days of the week, and months of the year.**  Just in Time (Locate current year and use calendar)  <http://www.fi.edu/time/Journey/JustInTime/calendar/calendar1.html>  Enchanted Learning (Scroll down to calendars)  <http://www.enchantedlearning.com/themes/calendar.shtml> |
| **M.O.1.4.4** | **explain time concept in context of personal experience.**  What’s the Time?  <http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/time/index.htm> |
| **M.O.1.4.5** | **read time to the half hour using an analog and digital clock.**  Teaching Clock  [http://www.crickweb.co.uk/assets/resources/flash.php?&file=Toolkit index2a](http://www.crickweb.co.uk/assets/resources/flash.php?&file=Toolkit%20index2a%20%20) |
| **M.O.1.4.6** | **identify, count, trade and organize the following coins and bill to display a variety of price values from real-life examples with a total value of 100 cents or less.**   * **penny** * **nickel** * **dime** * **quarter** * **dollar bill**   Numeration  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=86> |
| **Grade 1** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.1.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.1.5.1** | **identify a real life situation to gather data over time; make a hypothesis as to the outcome; design and implement a method to collect, organize, and analyze the results to make a conclusion; evaluate the validity of the hypothesis based upon collected data; design a mode of presentation using a pictograph and a bar graph (with and without technology).**  Bar Chart (Whole class activity)  <http://nlvm.usu.edu/en/nav/frames_asid_323_g_1_t_5.html?from=category_g_1_t_5.html>  Bar Graph Generator (Whole class activity)  <http://www.mrnussbaum.com/smartpoll2.htm> |
| **M.O.1.5.2** | **conduct simple experiments, record data on a tally chart or table and use the data to predict which of the events is more likely or less likely to occur if the experiment is repeated.**  Number Patterns  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=101&tsele3i=253> |

**2nd Grade Math Resources**

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| **Grade 2** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.2.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.2.1.1** | **read, write, order, and compare numbers to 1,000 using multiple strategies (e.g. symbols, manipulatives, number line).**  Numbers, Numbers Everywhere!  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=90>  Wabbit Words  <http://www.ictgames.com//rabbit2.html>  Least to Greatest  <http://www.haelmedia.com/html/og_m1_001.html>  Number Balance  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=nbKS1> |
| **M.O.2.1.2** | **justify any number as odd or even and determine if a set has an odd or even number of elements.**  Numbers, Numbers Everywhere!  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=90>  Dragon Eggs  <http://www.ictgames.com/dragonmap.html>  Odd or Even?  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=npmenu> |
| **M.O.2.1.3** | **count and group concrete manipulatives by ones, tens, and hundreds to 1,000.**  Numbers, Numbers Everywhere!  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=90>  Saxon Math Skip Counting: Fill in the missing numeral.  <http://www.haelmedia.com/html/mc_m1_004.html>  Interactive Hundred Chart  <http://www.apples4theteacher.com/math/games/100-number-chart-one.html>  Grouping by 10’s and 1’s  <http://www.edbydesign.com/btcount.html>  Place Values  <http://www.aaamath.com/B/g21b_px1.htm> |
| **M.O.2.1.4** | **model and identify place value of each digit utilizing standard and expanded form through 1000.**  Numbers, Numbers Everywhere!  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=90>  Expanded Form of Numbers  <http://www.aaamath.com/B/g21d_px1.htm> |
| **M.O.2.1.5** | **identify and read any ordinal number to identify position in a sequence.**  Numbers, Numbers Everywhere!  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=90>  Wash Line  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=washindex> |
| **M.O.2.1.6** | **round any 3-digit number to both the nearer 10 and 100.**  Math Journey (Select rounding section)  <http://www.quia.com/mathjourney.html> |
| **M.O.2.1.7** | **Identify and explain fractions as part of a whole and as part of a set/group using models.**  Blast Off! “Space”-ial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=94> |
| **M.O.2.1.8** | **model and justify the relationship between addition and subtraction (e.g., identity element of addition, associative property,**  **commutative property, inverse operations, fact families).**  Operations for the Number Doctor  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=87>  Addition Math Facts (Fact Families in the Addition Generator)  <http://www.mrnussbaum.com/grades123math.htm> |
| **M.O.2.1.9** | **demonstrate quick recall of basic addition facts with sums to 18 and corresponding subtraction facts.**  Operations for the Number Doctor  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=87>  Alien Addition  <http://www.arcademicskillbuilders.com/games/alien/alien.html>  Bowling Subtraction  <http://www.abc.net.au/countusin/games/game8.htm>  Mystery Picture  <http://www.dositey.com/addsub/mystery1S.htm>  Digit Workout  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=digitmenu> |
| **M.O.2.1.10** | **model 2- and 3-digit addition and subtraction with regrouping using multiple strategies.**  Operations for the Number Doctor  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=87>  Math Mayham  <http://www.learningplanet.com/act/mayhem/index.asp>  Arithmetic Four  <http://www.shodor.org/interactivate/activities/ArithmeticFour/>  Digit Workout  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=digitmenu> |
| **M.O.2.1.11** | **add and subtract 2- and 3-digit numbers without regrouping.**  Operations for the Number Doctor  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=87>  Mystery Picture (2 digit numbers)  <http://www.dositey.com/addsub/mystery2S.htm>  Digit Workout  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=digitmenu> |
| **M.O.2.1.12** | **use rounding to analyze the reasonableness of a sum or a difference.**  Operations for the Number Doctor  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=87> |
| **M.O.2.1.13** | **create story problems that require one or two-step procedures, using a variety of strategies explain the reasoning used , justify the procedures selected and present the results.**  Math Story Problems  <http://www.mathcats.com/storyproblems.html>  Quia Story Problems  <http://www.quia.com/pop/13193.html> |
| **Grade 2** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.2.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.2.2.1** | **analyze, describe, extend and create a growing pattern using objects or numbers.**  Fairy Fog  <http://www.ictgames.com/fairyfog.html>  Color Patterns  <http://nlvm.usu.edu/en/nav/frames_asid_184_g_1_t_1.html>  AAA Math: Patterns  <http://www.aaamath.com/B/pat.htm> |
| **M.O.2.2.2** | **explain how one variable produces a change in another variable.** |
| **M.O.2.2.3** | **describe, complete and extend a variety of counting patterns, according to a given rule.**  Ambleweb Function Machine  <http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html>  NLVM Function Machine  <http://nlvm.usu.edu/en/nav/frames_asid_191_g_3_t_1.html>  Function Machine  <http://www.mathplayground.com/FunctionMachine.html> |
| **M.O.2.2.4** | **create physical models to demonstrate equivalency of two numerical expressions written as a grade-appropriate number sentence.** |
| **Grade 2** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.2.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.2.3.1** | **identify and describe the following geometric solids according to the number of faces and edges:**   * **rectangular solid** * **cube** * **cylinder** * **cone** * **pyramid**   Blast Off! “Space”-ial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=94>  National Library of Virtual Manipulatives  <http://nlvm.usu.edu/en/NAV/topic_t_3.html> |
| **M.O.2.3.2** | **compare and contrast plane and solid geometric shapes.**  Blast Off! “Space”-ial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=94> |
| **M.O.2.3.3** | **identify and draw congruent shapes that have been rotated or reflected.**  Blast Off! “Space”-ial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=94>  Math Is Fun!  <http://www.mathsisfun.com/geometry/congruent.html> |
| **M.O.2.3.4** | **model and draw line segments and angles.** |
| **M.O.2.3.5** | **plot and describe the path between locations on a grid.**  Plot the Path (Lesson Plan)  <http://wupcenter.mtu.edu/education/great_lakes_maritime/whitefish_point/lesson_plans2008/3_path.pdf> |
| **M.O.2.3.6** | **identify similar shapes.**  Blast Off! “Space”-ial Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=94> |
| **Grade 2** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.2.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.2.4.1** | **identify a real life situation to use appropriate measurement tools; over time make a hypothesis as to the change overtime using whole units:**   * **length in centimeters and inches,** * **temperature in Celsius and Fahrenheit,** * **weight/mass in pounds and kilograms, and design and implement a method to collect, organize, and analyze data; analyze the results to make a conclusion evaluate the validity of the hypothesis based upon collected data; design a mode of presentation (with and without technology).**   Area and Perimeter in Second Grade  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=95>  Adam Ant Explores Perimeter  <http://www.beaconlearningcenter.com/WebLessons/AdamAnt/page1.htm> |
| **M.O.2.4.2** | **estimate and determine the perimeter of squares, rectangles and triangles.**  Area and Perimeter in Second Grade  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=95>  Shape Surveyor  <http://www.funbrain.com/poly/index.html>  Perimeter and Area  <http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/perimeter_and_area/index.html>  Perimeter Explorer  <http://www.shodor.org/interactivate/activities/PerimeterExplorer/>  Perimeter of a Square  <http://www.aaamath.com/B/geo78_x8.htm>  Perimeter of a Rectangle  <http://www.aaamath.com/B/geo78_x7.htm> |
| **M.O.2.4.3** | **estimate and count the number of square units needed to cover a given area using manipulatives.**  Area and Perimeter in Second Grade  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=95>  Area Explorer  <http://www.shodor.org/interactivate/activities/AreaExplorer/>  Compare Area and Perimeter  <http://www.shodor.org/interactivate/activities/ShapeExplorer/> |
| **M.O.2.4.4** | **order events in relation to time.**  Teachnology Order of Events (Worksheets)  <http://www.teach-nology.com/worksheets/language_arts/sequence/> |
| **M.O.2.4.5** | **determine past and future days of the week and identify specific dates, given a calendar.**  Multi Year Calendar (Whole group activity)  <http://personal.ecu.edu/mccartyr/MyCalendar.html> |
| **M.O.2.4.6** | **read time to the quarter hour using an analog and digital clock.**  Count Us In!  <http://www.abc.net.au/countusin/games/game10.htm>  Clockworks  <http://www.mrnussbaum.com/clockworks.htm>  Telling Time 1  <http://www.harcourtschool.com/activity/telling_time_gr1/>  Telling Time 2  <http://www.harcourtschool.com/menus/preview/harcourt_math/tellingtime_splash2.html>  Telling Time 3  <http://www.harcourtschool.com/activity/telling_time_gr3/>  Telling Time 4  <http://www.harcourtschool.com/activity/telling_time_gr4/>  Willie the Watchdog  <http://www.harcourtschool.com/activity/willy/willy.html>  Missing Hands  <http://www.mathsyear2000.org/magnet/minus3/missinghands/index.html> |
| **M.O.2.4.7** | **identify, count and organize coins and bills to display a variety of price values from real-life examples with a total value of one dollar or less and model making change using manipulatives.**  Cash Out  <http://www.mrnussbaum.com/cashout/index.html>  Change Maker  <http://www.funbrain.com/cashreg/>  Farm Stand  <http://www.prongo.com/farm/game.html>  Spending Money  <http://www.primarygames.com/Spending%20Spree/5bl.htm> |
| **Grade 2** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.2.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.2.5.1** | **create, read, and interpret a pictograph with each picture representing greater than or equal to a single unit.**  Pictograph  <http://www.eduplace.com/kids/mw/wr/1/wr1_01.html>  Pictograph Lesson  <http://www.eduplace.com/math/mw/models/overview/1_4_2.html>  All the Parts  <http://www.beaconlearningcenter.com/WebLessons/AllTheParts/default.htm> |
| **M.O.2.5.2** | **conduct simple experiments with more than two outcomes and use the data to predict which event is more, less, or equally likely to occur if the experiment is repeated.**  Operations for the Number Doctor  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=87> |
| **M.O.2.5.3** | **analyze data represented on a graph using grade-appropriate questions.**  Make a Bar Graph  <http://nlvm.usu.edu/en/nav/frames_asid_190_g_1_t_1.html>  Kids Have Special Pets  <http://www.beaconlearningcenter.com/WebLessons/KidsHavePets/default.htm#page1> |
| **M.O.2.5.4** | **formulate questions, collect data, organize and display as a chart, table or bar graph.**  Operations for the Number Doctor  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=102&tsele3i=87>  Make a Bar Graph  <http://nlvm.usu.edu/en/nav/frames_asid_190_g_1_t_1.html>  BBC Bitesize: Collecting Data  <http://www.bbc.co.uk/schools/ks2bitesize/maths/activities/interpretingdata.shtml> |

***3rd Grade Math Resources***

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| **Grade 3** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.3.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.3.1.1** | **read, write, order, and compare numbers to 10,000 using a variety of strategies (e.g., symbols, manipulatives, number line).**  Writing Big Numbers  <http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/writingbignumbers/>  Comparing Numbers  <http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/comparing/> |
| **M.O.3.1.2** | **read, write, order, and compare decimals to hundredths, with manipulatives.**  Comparing Numbers  <http://www.quia.com/pop/7512.html>  Read and Write Decimals  <http://www.aaaknow.com/g37a_wx1.htm>  Ordering Decimals  <http://www.interactivestuff.org/sums4fun/switch.html>  Comparing and Ordering Decimals  <http://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=208> |
| **M.O.3.1.3** | **identify place value of each digit utilizing standard and expanded form to 10,000.**  Expanded Form (Math Coach)  <http://www.icoachmath.com/SiteMap/ExpandedForm.html>  Place Value Play Off  <http://www.quia.com/mc/279741.html>  Place Value (PPT)  <http://www.hcbe.net/itc/powerpoints/files/8737EFD19A85430C9F38C473B0ABBB19.ppt>  What’s Your Name?  <http://www.beaconlearningcenter.com/Weblessons/WhatsYourName/default.htm> |
| **M.O.3.1.4** | **apply estimation skills (rounding, benchmarks, compatible numbers) to solve and evaluate reasonableness of an answer.**  AAA Math: Estimation  <http://www.aaaknow.com/est.htm>  Estimation Contraption  <http://pbskids.org/cyberchase/games/ballparkestimation/index.html> |
| **M.O.3.1.5** | **demonstrate an understanding of fractions as part of a whole/one and as part of a set/group using models and pictorial representations.**  Identifying Fractions  <http://visualfractions.com/EnterCircle.html>  Shading the Fraction  <http://www.interactivestuff.org/sums4fun/shade.html>  Fractions Interactive Lesson  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=80>  Fraction Pie Level 3  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=45>  Fraction Pie Level 2  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=44>  Fractions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=132> |
| **M.O.3.1.6** | **create concrete models and pictorial representations to**   * **compare and order fractions with like and unlike denominators,** * **add and subtract fractions with like denominators,**   **and verify results.**  Fractions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=132> |
| **M.O.3.1.7** | **use concrete models and pictorial representations to demonstrate an understanding of equivalent fractions, proper and improper fractions, and mixed numbers.**  Fractions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=132> |
| **M.O.3.1.8** | **add and subtract 2- and 3-digit whole numbers and money with and without regrouping.**  Northpole Money  <http://www.northpole.com/Clubhouse/Games/CountMoney/>  Subtracting 3-digits  <http://www.aaaknow.com/g38o_sx1.htm>  Subtracting 2-digits  <http://www.aaaknow.com/g3_28dx1.htm> |
| **M.O.3.1.9** | **demonstrate and model multiplication (repeated addition, arrays) and division (repeated subtraction, partitioning).**  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.1.10** | **use and explain the operations of multiplication and division including the properties (e.g., identity element of multiplication,**  **commutative property, property of zero, associative property, inverse operations).**  Relationship of Multiplication and Division  <http://www.aaaknow.com/g34c_ix1.htm>  Multiplication Properties  <http://www.321know.com/pro74bx2.htm>  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.1.11** | **recall basic multiplication facts and the corresponding division facts.**  Math Facts 0-3  <http://www.aaaknow.com/g39a_mx1.htm>  Math Facts 4-6  <http://www.aaaknow.com/g39b_mx1.htm>  North Pole Flashcards for Math Facts  <http://www.northpole.com/Clubhouse/Games/Flashcards/>  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.1.12** | **model the distributive property in multiplication of 2- and 3-digit numbers by a 1-digit number.**  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.1.13** | **use models to demonstrate division of 2- and 3-digit numbers by a 1-digit number.**  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.1.14** | **create grade-appropriate real-world problems involving any of the four operations using multiple strategies, explain the reasoning used, and justify the procedures selected when presenting solutions.**  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.1.15** | **create grade-appropriate real-world problems involving any of the four operations using multiple strategies, explain the reasoning used, and justify the procedures selected when presenting solutions.**  Fun on the Farm  <http://www.prongo.com/farm/game.html>  Lemonade Larry  <http://www.prongo.com/lemon/game.html>  Lemonade Stand  <http://www.ae4rv.com/games/lemonade.htm>  Order of Operations Lesson Plan  <http://www.lessonplanspage.com/MathCIOrderOfOperationsPhotoStory68.htm> |
| **Grade 3** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.3.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.3.2.1** | **analyze and extend geometric and numeric patterns.**  Construct a Solid  <http://illuminations.nctm.org/index_d.aspx?id=409>  Looking for Patterns  <http://illuminations.nctm.org/index_d.aspx?id=408>  Illuminations  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L406> |
| **M.O.3.2.2** | **create an input/output model using addition, subtraction, multiplication or division.**  Number Cruncher  <http://www.shodor.org/interactivate/activities/numbercruncher/index.html>  Function Machines  <http://www.mathplayground.com/FunctionMachine.html>  <http://shodor.org/interactivate/activities/FunctionMachine/?version=1.6.0_10&browser=MSIE&vendor=Sun_Microsystems_Inc>  <http://nlvm.usu.edu/en/NAV/frames_asid_191_g_3_t_1.html> [www.amblesideprimary.com/ambleweb/mentaImaths/functionmachines.html](http://www.amblesideprimary.com/ambleweb/mentaImaths/functionmachines.html)  Stop that Creature!  [pbskids.org/cyberchase/games/functions/functions.html](http://pbskids.org/cyberchase/games/functions/functions.html) |
| **M.O.3.2.3** | **analyze a given pattern and write the rule.**  Looking back and moving forward  <http://illuminations.nctm.org/index_d.aspx?id=314>  Analyzing Designs  <http://illuminations.nctm.org/index_d.aspx?id=311>  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.2.4** | **write equivalent numerical expressions and justify equivalency.**  Pan Balance: Numbers  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=26> |
| **M.O.3.2.5** | **use symbol and letter variables to represent an unknown quantity and determine the value of the variable.**  The Variable Machine  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L291> |
| **Grade 3** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.3.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.3.3.1** | **identify and create new polygons by transforming, combining and decomposing polygons.**  Identify Polygons  <http://www.aaamath.com/B/geo318x4.htm>  Names of Polygons  <http://www.aaamath.com/B/geo318x1.htm>  Third Grade Geometry Informal Assessment Tasks (Scroll down to M.O.3.3.1)  <http://wvde.state.wv.us/teach21/documents/3rdGradeGeometry.doc> |
| **M.O.3.3.2** | **identify, describe, and classify the following geometric solids according to the number of faces, edges, and vertices:**   * **cube** * **rectangular solid** * **cylinder** * **cone** * **pyramid**   Geometric Solids  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=70>  Third Grade Geometry Informal Assessment Tasks (Scroll down to M.O.3.3.2)  <http://wvde.state.wv.us/teach21/documents/3rdGradeGeometry.doc> |
| **M.O.3.3.3** | **construct and identify a solid figure from a plane drawing.**  Third Grade Geometry Informal Assessment Tasks (Scroll down to M.O.3.3.3)  <http://wvde.state.wv.us/teach21/documents/3rdGradeGeometry.doc> |
| **M.O.3.3.4** | **identify, describe and draw lines of symmetry in two-dimensional shapes.**  Third Grade Geometry Informal Assessment Tasks (Scroll down to M.O.3.3.4)  <http://wvde.state.wv.us/teach21/documents/3rdGradeGeometry.doc> |
| **M.O.3.3.5** | **model, describe, and draw**   * **lines** * **rays** * **angles including right, obtuse, and acute angles.**   Jenny’s Dictionary of Math Terms  <http://www.teachers.ash.org.au/jeather/maths/dictionary.html>  Third Grade Geometry Informal Assessment Tasks (Scroll down to M.O.3.3.5)  <http://wvde.state.wv.us/teach21/documents/3rdGradeGeometry.doc> |
| **M.O.3.3.6** | **draw an example of a flip, slide and turn (reflection, translation, and rotation) given a model.**  Third Grade Geometry Informal Assessment Tasks (Scroll down to M.O.3.3.6)  <http://wvde.state.wv.us/teach21/documents/3rdGradeGeometry.doc> |
| **M.O.3.3.7** | **name the location of a point on a first-quadrant grid, represent using ordered pairs.**  Third Grade Geometry Informal Assessment Tasks (Scroll down to M.O.3.3.7)  <http://wvde.state.wv.us/teach21/documents/3rdGradeGeometry.doc> |
| **Grade 3** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.3.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.3.4.1** | **Within a project based investigation, identify a real life situation, consider a number of variables and use appropriate measurement tools, overtime, make a hypothesis as to the change overtime; with more precision than whole units;**   * **length in centimeters and inches,** * **temperature in Celsius and Fahrenheit** * **weight/mass in pounds and kilograms,**   **and design and implement a method to collect, organize, and analyze data; analyze results to make a conclusion; evaluate the validity of the hypothesis upon collected data; design a mode of presentation (with and without technology).**  Funbrain Measure It!  <http://www.funbrain.com/measure/>  Edheads Temperature Converter  <http://www.edheads.org/activities/weather/temp_conv.htm>  Converting Kilograms and Pounds  <http://www.manuelsweb.com/kg_lbs.htm> |
| **M.O.3.4.2** | **estimate and find the perimeter and area of familiar geometric shapes, using manipulatives, grids, or appropriate measuring tools.**  Finding Perimeter and Area (Interactive lesson plan)  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L651>  Perimeter and Area of My Clubhouse (Activity page)  <http://illuminations.nctm.org/Lessons/Architect/Architect-AS-PerimArea.pdf> |
| **M.O.3.4.3** | **determine the formula the area of a rectangle and explain reasoning through modeling.**  Area of a Square/Rectangle  <http://library.thinkquest.org/TQ0311000/square_rectangle.htm>  AAA Math: Area of a Rectangle  <http://www.321know.com/geo78_x3.htm> |
| **M.O.3.4.4** | **read time to 5-minute intervals (am and pm) using analog and digital clocks, compute elapsed time to the quarter-hour using a clock.**  Measure It  <http://www.funbrain.com/measure/index.html>  The Ruler Game  <http://www.rickyspears.com/rulergame/>  Metric Value in Words  <http://www.aaaknow.com/g3_212x3.htm> |
| **M.O.3.4.5** | **identify, count and organize coins and bills to display a variety of price values from real-life examples with a total value of $100 or less and model making change using manipulatives.**  Change Maker  <http://www.funbrain.com/cashreg/index.html>  North Pole Money  <http://www.northpole.com/Clubhouse/Games/CountMoney/> |
| **M.O.3.4.7** | **calculate elapsed time to quarter-hour.**  Just in Time  <http://www.fi.edu/time/Journey/JustInTime/contents.html>  Northpole Time  <http://www.northpole.com/Clubhouse/Games/TellTime/> |
| **Grade 3** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.3.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.3.5.1** | **collect and organize grade-appropriate real-world data from observation, surveys, and experiments, and identify and construct appropriate ways to display data.**  Fractions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=132>  Multiplication and Division  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=131> |
| **M.O.3.5.2** | **develop and conduct grade-appropriate experiments using concrete objects (e.g. counters, number cubes, spinners) to determine the likeliness of events and list all outcomes.**  Marble Mania  <http://www.sciencenetlinks.com/lessons.cfm?DocID=389>  Virtual Coin Toss  <http://pbskids.org/cyberchase/games/probability/index.html> |
| **M.O.3.5.3** | **analyze real-world data represented on a graph using grade-appropriate questions.**  Create A Graph  <http://nces.ed.gov/nceskids/graphing/index.asp>  What’s the Point?  <http://www.funbrain.com/cgi-bin/shtml.cgi?A1=../co/index.html>  Find Hurkle  <http://www.aimsedu.org/aimskids/ipuzzles/hurkle/hurkle.html>  What Comes Next?  <http://www.saxonpublishers.com/activities/cgi-bin/mchoicepage?mc_m3_002>  Fractions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=103&tsele3i=132> |

**4th Grade Math CSO Resources**

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| **Grade 4** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.4.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.4.1.1** | **read, write, order, and compare whole numbers to the millions place and decimals to thousandths place using a variety of strategies (e.g. symbols, manipulatives, number line, pictorial representations).**  Ordering 6-digit Numbers  <http://www.aaaknow.com/cmp41cx2.htm>  Ordering 4-digit Numbers  <http://www.aaaknow.com/cmp33_x3.htm>  Ordering 3-digit Numbers  <http://www.aaaknow.com/cmp22cx2.htm>  Comparing 4-digit Numbers  <http://www.aaaknow.com/cmp33_x2.htm>  Comparing 5-digit Numbers  <http://www.aaaknow.com/cmp41fx2.htm>  Comparing 6-digit Numbers  <http://www.aaaknow.com/cmp41gx2.htm>  Comparing 7-digit Numbers  <http://www.aaaknow.com/cmp41bx2.htm>  Place Value Puzzler  <http://www.funbrain.com/tens/index.html>  One False Move  <http://www.funbrain.com/ofm/index.html>  Math Playground  <http://www.mathplayground.com/>  Rainforest Math  <http://www.rainforestmaths.com/>  NLVM  <http://nlvm.usu.edu/en/nav/category_g_2_t_1.html> |
| **M.O.4.1.2** | **demonstrate an understanding of the place value of each digit utilizing standard and expanded form through 1,000,000 with multiples of 10 [(5 X 10,000) + (3 X 1,000) + (4 X 10) + 2].**  Indentify Place Value  <http://www.aaaknow.com/plc41ax2.htm>  Place Value through Hundreds  <http://www.aaaknow.com/plc21cx2.htm>  Write numeral Based on Place Values  <http://www.aaaknow.com/plc21ex2.htm>  Identify Place Value through 100,000’s  <http://www.aaaknow.com/plc31_x2.htm>  Identify Place Value through 1,000,000  [http://www.aaaknow.com/plc41ax2.htm \](http://www.aaaknow.com/plc41ax2.htm%20\)  Quizville  <http://www.quizville.com/mathGames/placeValueAndRounding/index.html>  Place Value Charts  <http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/853/PlaceValueChartv4.swf>  Expanded Numbers  <http://www.dositey.com/addsub/Mystery10.htm> |
| **M.O.4.1.3** | **estimate solutions to problems including rounding, benchmarks, compatible numbers and evaluate the reasonableness of the solution, justify results.**  Cyberchase  <http://pbskids.org/cyberchase/games/ballparkestimation/ballparkestimation.html>  Estimator Four  <http://www.shodor.org/interactivate/activities/EstimatorFour/> |
| **M.O.4.1.4** | **using concrete models, benchmark fractions, number line**   * **compare and order fractions with like and unlike denominators** * **add and subtract fractions with like and unlike denominators** * **model equivalent fractions** * **model addition and subtraction of mixed numbers with and without regrouping.**   Fraction Pie Level 3  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=45>  Fraction Pie Level 2  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=44>  AAA Math  <http://321know.com/grade4>  Math Tool Kit: Hooked on Problem Solving  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/4_hooked.php>  Fractions Interactive Lesson  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=80>  Equivalent Fractions  <http://www.learningplanet.com/sam/ff/index.asp>  Fresh Baked Fractions  <http://www.funbrain.com/fract/index.html>  Shading  <http://www.interactivestuff.org/sums4fun/shade.html>  Subtracting Mixed Numbers  <http://www.321know.com/fra66ex2.htm>  Adding Mixed Numbers  <http://www.321know.com/fra66dx2.htm>  Soccer Shootout  <http://www.funbrain.com/fractop/index.html>  Understanding Decimals and Fractions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm>  Fishy Fractions  <http://www.iknowthat.com/com/L3?Area=FractionGame>  Flowering Fractions  <http://www.learningbox.com/fractions/index.html>  Fraction Switch  <http://www.interactivestuff.org/sums4fun/fswitch.html>  Shading  <http://www.interactivestuff.org/sums4fun/shade.html>  Pizza Shop  <http://www.mrnussbaum.com/tonyfraction.htm> |
| **M.O.4.1.5** | **analyze the relationship of fractions to decimals using concrete objects and pictorial representations**  Fraction Game  <http://illuminations.nctm.org/tools/fraction/fraction.asp>  Online Integer Bars  <http://illuminations.nctm.org/swr/review.asp?SWR=4380>  Soccer Shootout  <http://www.funbrain.com/fractop/index.html>  Greater Than, Less Than, Equal  <http://www.321know.com/fra64ax2.htm>  Matching Fractions and Decimals  <http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/game.shtml>  Change Fractions and Decimals  <http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/game.shtml>  Understanding Decimals and Fractions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm>?  Quizville  <http://www.quizville.com/mathGames/fractionsDecimalsAndPercents/index.html>  AAA Math  <http://321know.com/grade4>  Decifractator  <http://www.amblesideprimary.com/ambleweb/mentalmaths/fracto.html>  Fractions Bar  <http://arcytech.org/java/fractions/fractions.html>  Mission Magnetite  <http://pbskids.org/cyberchase/games/percent/percent.html>  Converter  <http://www.shodor.org/interactivate/activities/Converter/>  Dartboard Mental Math  <http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/852/2ring-centrev4.swf> |
| **M.O.4.1.6** | **round decimals to the nearest whole, 10th, or 100th place.**  Rounding Decimals  <http://www.321know.com/dec-round.htm>  Rounding Decimals and Whole Numbers (Matching)  <http://www.quia.com/mc/66061.html>  Rounding Decimals and Whole Numbers (Concentration)  <http://www.quia.com/cc/66061.html>  Rounding Flashcards  <http://www.teachingtreasures.com.au/maths/decimalsk-3/rounding-decimals2-3.htm>  Rounding to the Nearest Hundredth  <http://www.321know.com/dec44bx2.htm>  Rounding to the Nearest Tenth  <http://www.321know.com/dec44cx2.htm>  Place Value Puzzler  <http://www.funbrain.com/cgi-bin/tens.cgi?A1=s&A2=4&INSTRUCTS=1>  AAA Math  <http://321know.com/grade4>  Math Dictionary for Kids  <http://www.amathsdictionaryforkids.com/>  Funbrain: Place Value Puzzler  <http://www.funbrain.com/tens/index.html>  Place Value Pirates  <http://www.mrnussbaum.com/placevaluepirates1.htm> |
| **M.O.4.1.7** | **add and subtract whole numbers (up to five-digit number) and decimals to the 1000th place, multiply (up to three-digits by two-digits, and divide(up to a three-digit number with a one and two-digit number).**  Fact Dash  <http://www.mhschool.com/math/2003/student/factdash/popup.html>  Subtracting Equations-One Digit Numbers  <http://www.aaaknow.com/sub18dx2.htm>  Subtracting Without Renaming  <http://www.aaaknow.com/sub28_x2.htm>  Subtracting Using Words  <http://www.aaaknow.com/subk7jx2.htm>  One Digit Equation Addition  <http://www.aaaknow.com/add18cx1.htm>  Adding Two Numbers Without Renaming  <http://www.aaaknow.com/add27_x4.htm>  Adding Three Numbers  <http://www.aaaknow.com/add27_x2.htm>  Cyberchase (Adding Decimals)  <http://pbskids.org/cyberchase/games/decimals/decimals.html>  Quia (Adding Decimals)  <http://www.quia.com/rr/31090.html>  Adding and Subtracting Decimals  <http://www.math.com/school/subject1/lessons/S1U1L4GL.html#sm2>  Adding Decimals  <http://www.mcwdn.org/Decimals/AddDecimals.html>  Virtual Manipulative: Base Block Decimals  <http://matti.usu.edu/nlvm/nav/frames_asid_264_g_2_t_1.html>  Math Tools  <http://mathforum.org/mathtools/tool/12661/m4,6.4.10,ALL,ALL/>  Divide Whole Numbers  <http://www.aaaknow.com/g6_41_x1.htm>  Divide Long Numbers  <http://www.aaaknow.com/g6_55_x1.htm>  Arithmetic Four (Dividing Whole Numbers)  <http://www.shodor.org/interactivate/activities/ArithmeticFour/>  Planet Blaster Basics  <http://www.aplusmath.com/Games/PlanetBlasterBasics/index.html>  Space Shuttle Launch  <http://www.playkidsgames.com/games/shuttleLaunch/default.htm>  Robot Calculator  <http://www.playkidsgames.com/games/robot/default.htm>  Math Facts  <http://home.indy.rr.com/lrobinson/mathfacts/mathfacts.html>  Math Magician  <http://oswego.org/ocsd-web/games/mathmagician/maths1.html>  Math Baseball  <http://www.prongo.com/math/index.html>  Adding Using Words  <http://www.aaaknow.com/addk7ex1.htm>  Divide by 1-digit  <http://www.321know.com/div49bx2.htm>  Divide by 2-digit  <http://www.321know.com/div55_x2.htm>  Numbers in Groups  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=104&tsele3i=196>  AAA Math (Add Numbers)  <http://321know.com/add.htm>  AAA Math (Subtract Numbers)  <http://321know.com/sub.htm>  Quizville (Operations)  <http://www.quizville.com/mathGames/allFourOperations/index.html>  Drag Race Division  <http://arcademicskillbuilders.com/games/drag_race/drag_race.html> |
| **M.O.4.1.8** | **solve multi-digit whole number multiplication problems using a variety of strategies, including the standard algorithm, justify methods used.**  Whole Number Multiplication  <http://www.shodor.org/interactivate/activities/ArithmeticFour/>  Multiplication Bingo  <http://www.aplusmath.com/games/matho/MultMatho.html>  Multiplication Concentration  <http://www.aplusmath.com/Games/Concentration/Multiplication_Concentration.html>  Planet Blaster  <http://www.aplusmath.com/Games/PlanetBlasterBasics/index.html>  Math Magician  <http://oswego.org/ocsd-web/games/mathmagician/maths1.html>  Numbers in Groups  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=104&tsele3i=196>  AAA Math (Timz Attack)  <http://321know.com/mul.htm>  Cool Math: Lattice Multiplication  <http://www.coolmath4kids.com/times-tables/times-tables-lesson-lattice-multiplication-1.html> |
| **M.O.4.1.9** | **quick recall of basic multiplication facts and corresponding division facts.**  QuickFlash (Practice Multiplication Times Tables)  <http://www.multiplication.com/interactive/flashfun/flash/index.html>  <http://www.mhschool.com/math/2003/student/factdash/popup.html>  Multiplication Flashcards  <http://aplusmath.com/Flashcards/multiplication.html>  Division Flashcards  <http://aplusmath.com/Flashcards/division.html>  Math Flashcards (Add, Subtract, Multiply, Divide)  <http://www.factmonster.com/math/flashcards.html>  Jungle Jim (Multiplication Game)  <http://www.multiplication.com/flashgames/Drums.htm>  Mathmagician  <http://www.oswego.org/ocsd-web/games/Mathmagician/mathsmulti.html>  AAA Math  <http://321know.com/grade4>  Math Mystery (Add, Subtract, Multiply, Divide)  <http://www.mathmastery.com/cyberchallenge/>  Properties of Multiplication  <http://www.321know.com/mul74bx2.htm>  Math Tool: Properties of Multiplication  <http://mathforum.org/mathtools/tool/12440/a,11.2,ALL,ALL/> |
| **M.O.4.1.10** | **create grade-level real-world appropriate story problems using multiple strategies including simple ratios, justify the reason for choosing a particular strategy and present results.**  Lemonade Stand  <http://www.ae4rv.com/games/lemonade.htm>  Fun on the Farm  <http://www.prongo.com/farm/game.html>  Lemonade Larry  <http://www.prongo.com/lemon/game.html>  At the Mall  <http://www.mathplayground.com/mathatthemall1.html>  Identify the Ratio  <http://www.harcourtschool.com/activity/elab2004/gr5/16.html>  Body Measurements  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L659> |
| **Grade 4** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.4.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.4.2.1** | **determine the rule and explain how change in one variable relates to the change in the second variable, given an input/output model using two operations.**  Figure Out Variables Based on Given Information  <http://www.mathplayground.com/wangdoodles.html>  Input/Output Machine (Number Cruncher)  <http://www.shodor.org/interactivate/activities/numbercruncher/index.html>  Quizville  <http://www.quizville.com/numberMachine2.php>  Brain Pop (Math, Subscription required, FREE trial available)  <http://www.brainpop.com/math/seeall/>  Stop that Creature!  <http://pbskids.org/cyberchase/games/functions/functions.html>  Function Machine  <http://www.mathplayground.com/FunctionMachine.html>  Ambleweb Function Machine  <http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html> |
| **M.O.4.2.2** | **recognize and describe relationships in which quantities change proportionally.**  Penguin Waiter Tip Game  <http://www.funbrain.com/cgi-bin/pw.cgi?A1=s&A2=2>  What’s My Angle?  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2050> |
| **M.O.4.2.3** | **represent the idea of a variable as an unknown quantity using a letter, write an expression using a variable to describe a real-world situation.**  The Variable Machine Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L291>  Math Car Racing  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=106> |
| **M.O.4.2.4** | **solve real-world problems involving order of operations including grouping symbols and the four operations.**  Number Cruncher  <http://www.shodor.org/interactivate/activities/numbercruncher/index.html>  NVLM -3-5 Manipulatives  <http://matti.usu.edu/nlvm/nav/grade_g_2.html>  Order of Operations with Parenthesis  <http://www.mathplayground.com/wangdoodles.html>  Order of Operations Matching Game  <http://www.dositey.com/math/m/mystery1AM.htm>  Eco-Haven Emergency  <http://pbskids.org/cyberchase/quest3/launch.html>  Pattern Quest  <http://pbskids.org/cyberchase/games/data/data.html>  Crack Hacker’s Safe  <http://pbskids.org/cyberchase/webisode_1/web_1game.html>  Online Problem Solving  <http://www.berghuis.co.nz/abiator/maths/sa/saindex.html> |
| **Grade 4** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.4.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.4.3.1** | **identify, classify, compare and contrast two-dimensional (including quadrilateral shapes) and three-dimensional geometric figures according to attributes.**  Jenny’s Dictionary of Math terms  <http://www.teachers.ash.org.au/jeather/maths/dictionary.html>  Figures and Polygons –Quadrilaterals  <http://www.mathleague.com/help/geometry/polygons.htm#quadrilateral>  Quadrilateral Quest  <http://teams.lacoe.edu/documentation/classrooms/amy/geometry/6-8/activities/new_quads/quad1.html>  Quadrilateral Lesson with Quiz  <http://www.math.com/school/subject3/lessons/S3U2L3GL.html>  Manipulate Quadrilaterals  <http://www.mathsnet.net/dynamic/quads.html>  Polygons  <http://www.321know.com/geo318x4.htm>  Polygons II  <http://www.321know.com/geo318x1.htm>  Shapes  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=104&tsele3i=243>  Tantalizing Tangrams  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/4_tangrams.php>  Polygon Matching Game  <http://mathplayground.com/Matching_Shapes.html>  Sorting Triangles  <http://www.crickweb.co.uk/assets/resources/flash.php?&file=triangles> |
| **M.O.4.3.2** | **recognize and describe three-dimensional objects from different perspectives.**  3-D Shapes Hangman  <http://www.compasslearningodyssey.com/sample_act/math3_4/MA3CA05a-package_preloader.swf>  Make Cube Pattern  <http://www.harcourtschool.com/activity/elab2002/grade_4/021.html>  Solids and Shapes  <http://www.compasslearningodyssey.com/sample_act/math3_4/MA3CA05a-package_preloader.swf> |
| **M.O.4.3.3** | **identify, draw, label, compare and contrast, and classify**   * **lines (intersecting, parallel, and perpendicular)** * **angles (acute, right, obtuse, and straight)**   Jenny’s Dictionary of Math Terms  <http://www.teachers.ash.org.au/jeather/maths/dictionary.html>  Angles Hangman  <http://www.compasslearningodyssey.com/sample_act/math3_4/MA3CA02a_Right_Back_preloader.swf>  Make the Angle  <http://www.bbc.co.uk/schools/ks2bitesize/maths/activities/angles.shtml>  Find the Alien Using Angles  <http://www.mathplayground.com/alienangles.html>  Figure This! (Scroll down to Measurement)  <http://figurethis.org/challenges/math_index.htm>  Shapes, Lines, Angles, and Quilts  <http://sln.fi.edu/qa97/me6/>  Turtle Pond  <http://illuminations.nctm.org/ActivityDetail.aspx?id=83>  Figure This! What’s My Angle?  <http://www.figurethis.org/challenges/c10/challenge.htm> |
| **M.O.4.3.4** | **identify and create a two-dimensional design with one line of symmetry.**  Symmetry Movie  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/4_Line_Symmetry/index.html>  Line of Symmetry  <http://www.regentsprep.org/Regents/math/math-topic.cfm?TopicCode=symmetry>  Create Your Own Shape with One Line of Symmetry  <http://www.haelmedia.com/OnlineActivities_txh/mc_txh4_001.html>  Identify Shapes with Lines of Symmetry  <http://www.haelmedia.com/html/sg_m3_001.html>  Geometry in the World of Art Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U154>  Paper Quilts Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U104> |
| **M.O.4.3.5** | **graph/plot ordered pairs on a first-quadrant grid and use the coordinate system to specify location and describe path.**  Simple Coordinates Game  <http://www.shodor.org/interactivate/activities/SimpleCoordinates/>  Billy Bug and His Quest for Grub  <http://www.oswego.org/ocsd-web/games/BillyBug/bugcoord.html>  Billy Bug and His All New Quest for Grub  <http://www.oswego.org/ocsd-web/games/BillyBug2/bug2.html>  Funbrain: What’s the Point?  <http://www.funbrain.com/cgi-bin/co.cgi?A1=s&A2=0&INSTRUCTS=1>  Planet Hop  <http://www.bbc.co.uk/education/mathsfile/shockwave/games/planethop.html>  Hurkle  <http://www.aimsedu.org/aimskids/ipuzzles/hurkle/index.html> |
| **M.O.4.3.6** | **draw and identify parts of a circle: center point, diameter, and radius.**  Jenny’s Dictionary of Math Terms  <http://www.teachers.ash.org.au/jeather/maths/dictionary.html>  The Circle  <http://www.mathsteacher.com.au/year8/ch11_perimeter/05_circle/circle.htm>  Definitions & Quiz  <http://www.mathgoodies.com/lessons/vol2/geometry.html>  Circle Definitions, Practice, Quiz  <http://www.math.com/school/subject3/lessons/S3U1L6GL.html>  Shapes  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=104&tsele3i=243>  Lost in the Northern Frontier  <http://pbskids.org/cyberchase/games/circles/> |
| **M.O.4.3.7** | **select, analyze and justify appropriate use of transformations (translations, rotations, flips) to solve geometric problems including congruency and tiling (tessellations).**  Transformations on a Grid  <http://www.mathsisfun.com/geometry/transformations.html>  Transformations  <http://www.mathsnet.net/transform/rotindex.html>  Figure This! (Scroll down to Geometry)  <http://figurethis.org/challenges/math_index.htm>  Paper Quilts Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U104> |
| **Grade 4** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.4.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the unites, systems, and processes of measurement, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.4.4.1** | **select appropriate measuring tools, apply and convert standard units within a system to estimate, measure, compare and order real-world measurements including:**   * **lengths using customary (to the nearest one-fourth inch) and metric units,** * **weight,** * **capacity,** * **temperature, and**   **justify and present results.**  Comparing Metric Lengths  <http://www.aaaknow.com/g412_cx1.htm>  Converting Between U. S. Lengths  <http://www.aaaknow.com/g412_ux1.htm>  The Ruler Game  <http://www.rickyspears.com/rulergame/>  Measure It  <http://www.funbrain.com/measure/index.html>  Unit Conversion  <http://www.walter-fendt.de/m11e/conversion.htm>  AAA Math  <http://321know.com/mea.htm>  Math Tool Kit: Am I Related to Myself?  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/4_related.php>  Harcourt School: Equivalent Measure  <http://www.harcourtschool.com/activity/con_math/g04c24.dcr>  Artie Ounces Soda Jerk  <http://www.mrnussbaum.com/soda/index.html> |
| **M.O.4.4.2** | **Quantify area by finding the total number of same sized units that cover a shape, develop a rule and justify the formula for the area of a rectangle using the area model representing multiplication.**  Shape Surveyor  <http://www.funbrain.com/poly/index.html>  Area Explorer  <http://www.shodor.org/interactivate/activities/perm/index.html>  Find Area of Shapes  <http://www.shodor.org/interactivate/activities/AreaExplorer/>  Area VS Perimeter  <http://www.shodor.org/interactivate/activities/ShapeExplorer/>  Practice Finding Area Given Length and Width  <http://www.321know.com/geo78_x3.htm>  Figure This! (Scroll down to Geometry)  <http://figurethis.org/challenges/math_index.htm>  Figure This! (Scroll down to Area)  <http://321know.com/geo.htm> |
| **M.O.4.4.3** | **read time to the minute, calculate elapsed time in hours/minutes within a 24-hour period.**  Volume of a Rectangular Prism  <http://www.321know.com/geo79_x7.htm>  Read Time to the Minute  <http://www.shodor.org/interactivate/activities/ClockWise/>  Cyber Chase (Elapsed Time)  <http://pbskids.org/cyberchase/games/timelapse/timelapse.html>  Matching Activity  <http://www.quia.com/mc/66516.html>  Calculate Elapsed Time  <http://www.harcourtschool.com/activity/elab2002/grade_3/018.html>  Matching Activity  <http://www.quia.com/mc/66516.html>  Calculate Elapsed Time  <http://www.harcourtschool.com/activity/elab2002/grade_3/018.html>  Set Time on Clock to Show Elapsed Time  <http://nlvm.usu.edu/en/nav/frames_asid_318_g_2_t_4.html>  Quizville  <http://www.quizville.com/mathGames/readingClocksAndMaps/index.html>  Telling Time  <http://sln.fi.edu/qa96/spotlight11/spotlight11.html>  Elapsed Time Interactive Practice  <http://www.studyzone.org/testprep/math4/d/elapsedtime4p.cfm>  Elapsed Time Interactive Practice 2  <http://www.studyzone.org/testprep/math4/d/elapsed4p.cfm> |
| **M.O.4.4.4** | **given real-world situations, count coins and bills and determine correct change.**  Funbrain Change Maker  <http://www.funbrain.com/cashreg/>  US Mint-Making Change Game  <http://www.usmint.gov/kids/games/>  Counting Change  <http://www.quia.com/jg/65704.html>  AAA Math: Making Change from a Purchase  <http://www.321know.com/mny313x2.htm>  AAA Math: Coins for Change  <http://www.321know.com/mny313x3.htm>  Numbers in Groups  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=104&tsele3i=196>  Virtual Change Machine  <http://arcytech.org/java/money/money.html>  Math Playground: Count the Money  <http://www.mathplayground.com/Count_The_Money.html> |
| **Grade 4** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.4.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will:**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.4.5.1** | **read and interpret information represented on a circle graph.**  Make a Graph  <http://nces.ed.gov/nceskids/createagraph/default.aspx>  Survey Results Interpreted Using Graphs and Charts  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=104&tsele3i=165>  Circle Graph  <http://www.shodor.org/interactivate/activities/CircleGraph/> |
| **M.O.4.5.2** | **pose a grade-appropriate question that can be addressed with data, collect, organize, display, and analyze data in order to answer the question.**  Mean of 1-Digit Numbers  <http://www.aaaknow.com/sta418x5.htm>  Mode  <http://www.aaaknow.com/sta418x3.htm>  Range of 1-Digit Number  <http://www.aaaknow.com/sta418x4.htm>  Survey Results Interpreted Using Graphs and Charts  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=104&tsele3i=165>  Math Took Kit: Clarifying Lessons Lesson Plan  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/4_rolling.php>  Planning a Trip  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U115>  Bar Graph Creator  <http://www.amblesideprimary.com/ambleweb/mentalmaths/grapher.html>  Handling Data  <http://www.bbc.co.uk/schools/ks2bitesize/maths/handling_data.shtml>  Bugs in the System  <http://pbskids.org/cyberchase/games/bargraphs/bargraphs.html>  Send in the Trolls  <http://pbskids.org/cyberchase/games/dataclusters/index.html>  Bar Graph Sorter  <http://www.shodor.org/interactivate/activities/BarGraphSorter/>  Circle Graph  <http://www.shodor.org/interactivate/activities/CircleGraph/>  Histogram  <http://www.shodor.org/interactivate/activities/Histogram/> |
| **M.O.4.5.3** | **design and conduct a simple probability experiment using concrete objects, examine and list all possible combinations using a tree diagram, represent the outcomes as a ratio and present the results.**  Working with a Tree Diagram  <http://regentsprep.org/Regents/math/tree/PracTre.htm>  Tree Diagram  <http://math.youngzones.org/tree.html>  Lesson Idea for Teachers  <http://mathcentral.uregina.ca/RR/database/RR.09.97/loewen1.html>  Roll Two Dice  <http://www.shodor.org/interactivate/activities/ExpProbability/>  Design Spinner Along with Number of Spins  <http://www.shodor.org/interactivate/activities/BasicSpinner/>  Disguise Combos  <http://pbskids.org/cyberchase/games/combinations/combinations.html>  Virtual Coin Toss  <http://pbskids.org/cyberchase/games/probability/index.html>  Adjustable Spinner  <http://www.shodor.org/interactivate/activities/AdjustableSpinner/> |
| **M.O.4.5.4** | **solve real world problems using mean, median and mode.**  Looking Back and Moving Forward Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L524>  Food Court: Pizza Palace Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U149>  Dealing with Data in the Elementary School Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L297>  Mode, Median, and Mean  <http://www.bbc.co.uk/schools/ks2bitesize/maths/activities/modemedianmean.shtml> |

**5th Grade Math CSO Resources**

**General**

Who Wants to be a Millionaire? (Math and Science combined)

<http://education.jlab.org/million/>

**M.S.5.2 Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**

* **demonstrate understanding of patterns, relations and functions,**
* **represent and analyze mathematical situations and structures using algebraic symbols,**
* **use mathematical models to represent and understand quantitative relationships, and**
* **analyze change in various contexts.**

Algebra

<http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=232>

**M.S.5.3** **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships, specify locations and describe spatial relationships using coordinate geometry and other representational systems, apply transformations and use symmetry to analyze mathematical situations, and solve problems using visualization, spatial reasoning, and geometric modeling.**

Geometry

<http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=229>

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| **Grade 5** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.5.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.5.1.1** | **read, write, order and compare all whole numbers, fractions, mixed numbers and decimals using multiple strategies (e.g., symbols, manipulatives, number line).**  AAA Math: Comparing Numbers  <http://www.aaaknow.com/cmp.htm>  Number Sense  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=185>  Funbrain: Cookie Dough  <http://www.funbrain.com/numwords/index.html>  Ordering 6-digit Numbers  <http://www.aaaknow.com/cmp41cx2.htm>  Ordering 4-digit Numbers  <http://www.aaaknow.com/cmp33_x3.htm>  Ordering 3-digit Numbers  <http://www.aaaknow.com/cmp22cx2.htm>  Comparing 4-digit Numbers  <http://www.aaaknow.com/cmp33_x2.htm>  Comparing 5-digit Numbers  <http://www.aaaknow.com/cmp41fx2.htm>  Comparing 6-digit Numbers  <http://www.aaaknow.com/cmp41gx2.htm>  Comparing 7-digit Numbers  <http://www.aaaknow.com/cmp41bx2.htm>  Place Value Puzzler  <http://www.funbrain.com/tens/index.html>  One False Move  <http://www.funbrain.com/ofm/index.html>  Math Playground  <http://www.mathplayground.com/>  Rainforest Math  <http://www.rainforestmaths.com/>  NLVM  <http://nlvm.usu.edu/en/nav/category_g_2_t_1.html> |
| **M.O.5.1.2** | **demonstrate an understanding of place value of each digit utilizing standard and expanded form in any whole number using powers of 10 [(3 X 105) + (4 X 103) + 7 X 102) + (1 X 101) + 6].**  Identifying Place Value  <http://www.aaaknow.com/plc31ax2.htm>  Identifying Place Value 2  <http://www.aaamath.com/plc41a-placevalues.html>  There Must Be Thousands  <http://www.beaconlearningcenter.com/WebLessons/ThereMustBeThousands/default.htm>  What’s Your Name?  <http://www.beaconlearningcenter.com/WebLessons/WhatsYourName/default.htm> |
| **M.O.5.1.3** | **estimate solutions to problems involving whole numbers, decimals, fractions, and percents to determine reasonableness using benchmarks.**  Estimating Sums  <http://www.321know.com/est27bx2.htm>  Estimating Differences  <http://www.321know.com/est28bx2.htm>  Front End Estimation of Sums  <http://www.aaaknow.com/g5_73ax2.htm>  Front End Estimation of Differences  <http://www.aaaknow.com/g5_73ax1.htm>  Estimator Four  <http://www.shodor.org/interactivate/activities/egame/index.html>  More or Less Estimator  <http://www.shodor.org/interactivate/activities/estim3/index.html>  Estimator  <http://www.shodor.org/interactivate/activities/estim/index.html> |
| **M.O.5.1.4** | **use inductive reasoning to identify the divisibility rules of 2, 3, 5, 9 and 10 and apply the rules to solve application problems.**  Divisibility War  <http://edweb.sdsu.edu/courses/edtec670/Cardboard/card/d/Divisibility.html>  Divisibility Games  <http://www.quia.com/jfc/11125.html>  Divisibility Practice with Visual Clues  <http://www.vectorkids.com/vkdivisible.htm>  Divisibility Rules  <http://www.vectorkids.com/vkdivisible.htm>  Count On  <http://www.counton.org/explorer/primes/>  Numbers Divisible by 3  <http://www.321know.com/fra72_x4.htm#section3>  Numbers Divisible by 4  <http://www.321know.com/fra72_x5.htm>  Numbers Divisible by 5  <http://www.321know.com/fra72_x6.htm>  Numbers Divisible by 6  <http://www.321know.com/fra72_x7.htm>  Numbers Divisible by 7  <http://www.321know.com/fra72_x8.htm>  Numbers Divisible by 8  <http://www.321know.com/fra72_x9.htm>  Numbers Divisible by 9 and 10  <http://www.321know.com/fra72_x2.htm> |
| **M.O.5.1.5** | **determine and apply greatest common factor and lowest common multiple to write equivalent fractions and to real-world problem situations.**  Factor Tree  <http://nlvm.usu.edu/en/nav/frames_asid_202_g_3_t_1.html>  AAA Math: GCF  <http://www.321know.com/fra66gx2.htm>  Factors Galore A: Common Factors (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4223>  Factors Galore B: Get the Low Down (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4451>  Factors Galore C: Prime Factorization (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=5574> |
| **M.O.5.1.6** | **model and write equivalencies of fractions decimals, percents, and ratios.**  Fractions and Equivalent Decimals  <http://www.321know.com/g5_42bx1.htm>  Identifying Equivalent Decimals and Fractions  <http://www.321know.com/g5_42cx1.htm>  Converting a Fraction to a Percent  <http://www.321know.com/g5_61cx1.htm>  Converting a Decimal to a Percent  <http://www.321know.com/g5_61ex1.htm>  Shading  <http://www.interactivestuff.org/sums4fun/shade.html>  Fraction Frenzy  <http://www.learningplanet.com/sam/ff/index.asp>  Equivalent Fractions  <http://www.aaamath.com/B/fra42ax2.htm>  Fractions Tutorial  <http://www.kidsolr.com/math/fractions.html>  Match Equivalent Fractions  <http://www.harcourtschool.com/activity/con_math/g05c03.html>  Comparing Decimals  <http://www.aaamath.com/B/g6_52_x1.htm>  Putting Decimals in Order  <http://www.interactivestuff.org/sums4fun/switch.html>  Fraction Model 3  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=45>  Fraction Game Tool  <http://illuminations.nctm.org/tools/fraction/fraction.asp>  Fraction Decimal and Percent Challenge  <http://www.mathgoodies.com/lessons/vol4/challenge_vol4.html>  Matching Fractions Game  <http://www.interactivestuff.org/match/maker.phtml?featured=1&id=8> |
| **M.O.5.1.7** | **analyze and solve application problems and justify reasonableness of solution in problems involving addition and subtraction of:**   * **fractions and mixed numbers** * **decimals**   Soccer Shootout  <http://www.funbrain.com/fractop/index.html>  Adding Mixed Numbers  <http://www.aaaknow.com/g4_57dx1.htm>  Subtracting Mixed Numbers  <http://www.aaaknow.com/g4_57ex1.htm>  Addition of Fractions  <http://www.aaaknow.com/g410a_x1.htm>  Subtraction of Fractions  <http://www.aaaknow.com/g410a_x1.htm>  Visual Fractions  <http://www.visualfractions.com/>  Adding Fractions with Same Denominator  <http://www.aaaknow.com/g57a_ax1.htm>  Subtracting Decimals with Same Denominator  <http://www.aaaknow.com/g57b_sx1.htm>  Adding Mixed Numbers  <http://www.aaaknow.com/g57d_ax1.htm>  Party Planner  <http://www.beaconlearningcenter.com/WebLessons/ArrangeParty/default.htm> |
| **M.O.5.1.8** | **apply the distributive property as it relates to multiplication over addition.**  Division by Integers  <http://www.aaaknow.com/fra66px2.htm>  Dividing Fractions  <http://www.aaamath.com/fra66o-divfract.html>  Multiplication of Fractions  <http://www.aplusmath.com/Worksheets/Fractions.html>  Multiplying and Reducing Fractions  <http://www.aplusmath.com/cgi-bin/flashcards/fractions-mult>  Multiplying Fractions  <http://www.aaamath.com/fra66m-multfract.html> |
| **M.O.5.1.9** | **solve multi-digit whole number division problems using a variety of strategies, including the standard algorithm and justify the solutions.**  Division of Decimals by Whole Numbers  <http://www.aaamath.com/dec56a-divdeciint.html>  Interactive Maths  <http://www.mathsteacher.com.au/year7/ch06_decimals/10_div_whole/num.htm> |
| **M.O.5.1.10** | **demonstrate fluency in addition, subtraction, multiplication and division of whole numbers.**  Number Sense  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=185>  Grand Slam Math  <http://www.mathplayground.com/gsmbegin.html>  Grand Slam Math 2  <http://www.mathplayground.com/GrandSlamMath2.html>  Soccer Shootout  <http://www.funbrain.com/fractop/index.html>  Checking Division  <http://www.beaconlearningcenter.com/WebLessons/CheckingDivision/default.htm>  Division Factory  <http://www.sums.co.uk/playground/c3a/playground.htm>  On Target!  <http://www.beaconlearningcenter.com/WebLessons/OnTarget/default.htm> |
| **M.O.5.1.11** | **solve real-world problems involving whole numbers, decimals and fractions using multiple strategies and justify the reasonableness by estimation.**  Word Problems  <http://www.stfx.ca/special/mathproblems/>  Math Hoops  <http://www.mathplayground.com/mathhoops_Z1.html>  Math Story Problems  <http://www.mathcats.com/storyproblems.html>  Weekly Word Problems  <http://www.eduplace.com/math/brain/index.html>  Medieval Math Problems  <http://library.thinkquest.org/4471/>  Lemonade Stand  <http://www.ae4rv.com/games/lemonade.htm>  Guess the Number  <http://www.funbrain.com/guess2/index.html>  Cameron’s Trip  <http://www.beaconlearningcenter.com/WebLessons/CameronsTrip/default.htm>  Decimal Darts  <http://www.decimalsquares.com/dsGames/games/darts.html> |
| **Grade 5** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.5.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.5.2.1** | **use inductive reasoning to find missing elements in a variety of patterns (e.g., square numbers, arithmetic sequences).**  Powerful Patterns  <http://illuminations.nctm.org/index_o.aspx?id=69>  Mystery Operations  <http://www.learner.org/teacherslab/math/patterns/mystery/>  Logic Patterns  <http://www.learner.org/teacherslab/math/patterns/buttons/>  Algebra  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=232>  Patterns (Video)  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/5_Patterns/index.html>  Spooky Sequences  <http://www.oswego.org/ocsd-web/games/spookyseq/spookysqno.html>  Spy Guys (Click **Skip Intro**, then select **Lessons**, and then click on **Lesson 8)**  <http://www.learnalberta.ca/Launch.aspx?content=%2fcontent%2fmesg%2fhtml%2fmath6web%2fmath6shell.html> |
| **M.O.5.2.2** | **given an input/output model using two operations, determine the rule, output or input.**  Number Cruncher  <http://www.shodor.org/interactivate/activities/numbercruncher/index.html>  Function Machines  <http://www.mathplayground.com/FunctionMachine.html>  <http://shodor.org/interactivate/activities/FunctionMachine/?version=1.6.0_10&browser=MSIE&vendor=Sun_Microsystems_Inc>.  Algebra  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=232>  Ambleweb Function Machine  <http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html> |
| **M.O.5.2.3** | **solve simple equations and inequalities using patterns and models of real-world situations, create graphs on number lines of the equations and interpret the results.**  Algebra  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=232> |
| **M.O.5.2.4** | **model identify and describe square, prime and composite numbers.**  Factors and Prime Factors  <http://www.apples4theteacher.com/prime-factors.html>  Next Prime Number  <http://www.apples4theteacher.com/prime-factors.html>  Prime or Composite Number  <http://www.aaamath.com/g8-72-prime-or-composite.html>  Prime Factorization Tool  <http://www.mathsisfun.com/prime-factorization-tool.php>  AAA Math Prime or Composite?  <http://www.aaamath.com/B/fra63ax2.htm>  Ambleweb Prime Number Checker  <http://www.amblesideprimary.com/ambleweb/primenumber/primecheck.htm>  Spooky Sequences  <http://www.oswego.org/ocsd-web/games/spookyseq/spookysqno.html>  Count On  <http://www.counton.org/explorer/primes/> |
| **Grade 5** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.5.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.5.3.1** | **classify and compare triangles by sides and angles; measure the angles of a triangle using a protractor.**  Measuring Angles  <http://www.kidport.com/Grade6/Math/MeasureGeo/MeasuringAngles.htm>  Definitions and Examples  <http://www.mathleague.com/help/geometry/polygons.htm>  Identify Shape Flashcards  <http://www.aplusmath.com/cgi-bin/flashcards/geoflash>  Polygon Basics  <http://www.math.com/school/subject3/lessons/S3U2L1GL.html#sm4>  Explanations  <http://www.math.com/school/subject3/lessons/S3U2L3GL.html>  Types of Polygons  <http://www.aaamath.com/geo318-polygons-sides.html>  Virtual Protractor  <http://www.kidport.com/Grade6/Math/MeasureGeo/MeasuringAngles.htm>  What’s My Angle?  <http://www.madras.fife.sch.uk/maths/homelearning/Ambleside%20Flash/protractor.swf>  Triangle Explorer  <http://shodor.org/interactivate/activities/TriangleExplorer/> |
| **M.O.5.3.2** | **construct and analyze three-dimensional shapes using properties (i.e. edges, faces or vertices).**  Geometric Solids  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=70>  Isometric Drawing Tool  <http://illuminations.nctm.org/tools/isometric/isometric.asp>  Introduction to 3D Shapes  <http://www.icteachers.co.uk/children/sats/3d_shapes.htm#It%20is%20a%20pyramid.%20A%20square%20based%20pyramid>.  2 and 3D Shapes  <http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/3d/>  Tutorial  <http://www.bbc.co.uk/schools/ks2bitesize/index.shtml>  Match the 3D to the Plane  <http://www.harcourtschool.com/activity/mmath/mmath_dr_gee.html>  3D Concentration  <http://www.interactivestuff.org/match/maker.phtml?featured=1&id=15>  Investigate Vertices/Lines with Many 3D Shapes  <http://jcrystal.com/steffenweber/POLYHEDRA/p_00.html>  Geometry  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=229>  3D Object Viewer  <http://www.fi.uu.nl/toepassingen/00200/toepassing_wisweb.en.html>  Point Out the View  <http://pbskids.org/cyberchase/games/pointofview/index.html> |
| **M.O.5.3.3** | **create a design with more than one line of symmetry.**  Symmetry  <http://www.learner.org/channel/courses/learningmath/geometry/session7/part_a/>  Symmetry 2  <http://www.haelmedia.com/OnlineActivities_txh/mc_txh3_001.html>  Symmetry Video  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/4_Line_Symmetry/index.html>  Create A Snowflake Using Radial Symmetry  <http://gwydir.demon.co.uk/jo/symmetry/snow.htm>  Rotational Symmetry  <http://gwydir.demon.co.uk/jo/symmetry/rotsym.htm>  Identify the Type of Symmetry  <http://gwydir.demon.co.uk/jo/symmetry/examples.htm>  Make A Symmetrical Pattern Online  <http://gwydir.demon.co.uk/jo/symmetry/symm.htm>  Make More Symmetrical Patterns Online  <http://gwydir.demon.co.uk/jo/symmetry/symm3.htm>  Flag Symmetry Quiz  <http://www.adrianbruce.com/Symmetry/flags/quiz.htm>  Ask Hannah  <http://www.beaconlearningcenter.com/WebLessons/AskHannah/default.htm> |
| **M.O.5.3.4** | **construct a circle with a given radius or diameter.**  Geometry of Circles (Definitions)  <http://www.coolmath.com/reference/circles-geometry.html>  Interactive Circumference of a Circle  <http://www.mathwarehouse.com/geometry/circle/interactive-circumference.php> |
| **M.O.5.3.5** | **draw a similar figure using a scale, given a real-world situation.**  Transmograph  <http://www.shodor.org/interactivate/activities/transform/index.html>  Transmographer 2  <http://www.shodor.org/interactivate/activities/transform2/index.html> |
| **Grade 5** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.5.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.5.4.1** | **estimate, measure, compare, order and draw lengths of real objects in parts of an inch up to 1/8 of an inch and millimeters.**  Read A Ruler  <http://www.funbrain.com/measure/index.html>  Ruler Game  <http://www.rickyspears.com/rulergame/>  CM and MM Practice  <http://www.teachingmeasures.co.uk/menu.html>  Measurement  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=187> |
| **M.O.5.4.2** | **model, calculate and compare area of triangles and parallelograms using multiples strategies (including, but not limited to, formulas).**  Area Explorer  <http://www.shodor.org/interactivate/activities/perm/index.html>  Shape Explorer  <http://www.shodor.org/interactivate/activities/perm/index.html>  Area of a Triangle  <http://www.321know.com/g58_arx5.htm>  Area of a Parallelogram  <http://www.321know.com/g58_arx1.htm>  Find Area of Parallelograms  <http://www.edhelper.com/math/geometry104.htm>  More Find Area of Parallelograms  <http://www.edhelper.com/math/geometry201.htm>  Find Area of Parallelograms with Decimal Length  <http://www.edhelper.com/math/geometry202.htm>  Area Explorer  <http://www.beaconlearningcenter.com/WebLessons/AskHannah/default.htm>  Shape Explorer  <http://shodor.org/interactivate/activities/ShapeExplorer/> |
| **M.O.5.4.3** | **develop strategies (i.e. finding number of same sized units of volume)to determine the volume of a rectangular prism; solve application problems involving estimating or measuring volume of rectangular prisms.**  Volume of A Triangular Prism  <http://321know.com/geo79_x1.htm>  Predict Volume  <http://321know.com/geo79_x1.htm>  Find Perimeter  <http://www.edhelper.com/math/geometry101.htm>  Find Perimeter Using A Ruler  <http://www.edhelper.com/math/geometry102.htm>  Cubes  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=6>  How Many Pearls?  <http://www.pbs.org/wgbh/nova/pearl/uncountable.html> |
| **M.O.5.4.4** | **describe the effects on the measurements of a two-dimensional shape (such as its perimeter and area) when the shape is changed in some way, justify changes.**  Perimeter Explorer  <http://www.shodor.org/interactivate/activities/permarea/index.html>  Shape Surveyor  <http://www.funbrain.com/poly/index.html>  How Totally Square (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4454>  How Totally Square Part 2 (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4455>  Spy Guys (Click **Skip Intro**, then select **Lessons**, and then click on **Lesson 12)**  <http://www.learnalberta.ca/Launch.aspx?content=%2fcontent%2fmesg%2fhtml%2fmath6web%2fmath6shell.html>  Spy Guys (Click **Skip Intro**, then select **Lessons**, and then click on **Lesson 13)**  <http://www.learnalberta.ca/Launch.aspx?content=%2fcontent%2fmesg%2fhtml%2fmath6web%2fmath6shell.html> |
| **M.O.5.4.5** | **solve real-world problems requiring conversions within a system of measurement.**  Conversion of Temperature Celsius to Fahrenheit  <http://www.321know.com/g5_414x1.htm>  Conversion of Temperature Fahrenheit to Celsius  <http://www.321know.com/g5_414x2.htm>  Comparing Metric Masses  <http://www.321know.com/g511_cx4.htm>  Comparing Metric Length  <http://www.321know.com/g511_cx2.htm>  Comparing Metric Volume  <http://www.321know.com/g511_cx3.htm>  Convert Online  <http://www.allmath.com/metric.php>  Conversion Activities  <http://www.aaamath.com/B/mea.htm>  Measurement  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=105&tsele3i=187>  Unit Conversion  <http://www.walter-fendt.de/m11e/conversion.htm> |
| **M.O.5.4.6** | **estimate and/or measure the weight/mass of real objects in ounces, pounds, grams, and kilograms.**  Intermediate Interactive Measurement Quiz  <http://wings.avkids.com/Activities/Fundamentals/intermediate/measure.html>  Measurement Equivalents Matching  <http://www.harcourtschool.com/activity/con_math/g04c24.html>  Estimating Volume Pre-test  <http://www.shsu.edu/~txcae/Powerpoints/prepostest/estimatevolumeprestest.html>  Weight and Capacity Video  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/6_Weight_and_Capacity/index.html>  Teaching Measures  <http://www.teachingmeasures.co.uk/menu.html> |
| **M.O.5.4.7** | **collect, record, estimate and calculate elapsed times from real-world situations (with and without technology).**  Elapsed Time  <http://www.hbschool.com/activity/elab2002/grade_3/018.html>  Discovering Elapsed Time Games  <http://www.quia.com/jg/66516.html>  Various Games  <http://www.edu4kids.com/index.php?page=13>  Virtual Interactive Clock  <http://nlvm.usu.edu/en/nav/frames_asid_318_g_2_t_4.html>  Bedtime Bandits  <http://www.mrnussbaum.com/bedtime.htm>  Is it PE Time?  <http://www.beaconlearningcenter.com/WebLessons/IsItPETime/default.htm> |
| **M.O.5.4.8** | **determine the actual measurements of a figure from a scale drawing, using multiple strategies.**  Practice with Scale Drawings  <http://regentsprep.org/Regents/math/scale/PracScale.htm>  Glenco Math  <http://www.glencoe.com/sec/math/studytools/cgi-bin/msgQuiz.php4?isbn=0-02-833052-8&chapter=8&lesson=9>  Introduction to Scale Drawings  <http://regentsprep.org/Regents/math/scale/Lscale.htm>  Internet 4 Classrooms: 5th Grade (Scroll down to measurement)  <http://www.internet4classrooms.com/skills_5th_math.htm> |
| **Grade 5** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.5.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.5.5.1** | **construct a sample space and make a hypothesis as to the probability of a real life situation overtime, test the prediction with experimentation, and present conclusions (with and without technology).**  Identifying Probabilities as Fractions  <http://www.bbc.co.uk/education/mathsfile/shockwave/games/fish.html>  Probability Simulation App (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=6293>  Hey! That’s Not Fair Or Is It? (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4458>  Collect All Ten To Win (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4459>  Why Aren’t There More Reds in My Bag? (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4461>  Gemini Candy (Graphing Calculator)  <http://education.ti.com/educationportal/activityexchange/Activity.do?cid=US&aId=4462>  All That Data  <http://www.beaconlearningcenter.com/WebLessons/AllData/default.htm>  Eat Your Veggies (Lesson Plan)  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L356> |
| **M.O.5.5.2** | **construct, read, and interpret tables, charts, and graphs including stem and leaf plots to draw reasonable inferences or verify predictions.**  Probability  <http://www.shodor.org/interactivate/activities/prob/index.html>  Working with Tree Diagrams Practice  <http://regentsprep.org/Regents/math/tree/PracTre.htm>  Tree Diagram Examples  <http://regentsprep.org/Regents/math/tree/Ltree.htm>  Stem and Leaf Plots  <http://teachers.henrico.k12.va.us/math/ms/C1Files/05ProbStat/5_2/5-2Act1.html>  Stem and Leaf Plotter  <http://www.laredo.edu/mlmen/CLASSES%20ALL/ALL%20Past%20%20CLASSES/Spring2004/MA1351/InteractiveLessons/activities/stemleaf/index.html>  Stem and Leaf Group Project  <http://mainland.cctt.org/mathsummer/JosephBond/StemAndPlots/stem-and-leaf_std.htm>  Weather Watchers Lesson Plan  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L287>  Eat Your Veggies  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U114>  Graph Creator  <http://illuminations.nctm.org/ActivityDetail.aspx?id=20>  Collecting, Representing and Interpreting Data  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U124>  Create a Graph  <http://nces.ed.gov/nceskids/createagraph/> |
| **M.O.5.5.3** | **collect and organize real-world data to construct a circle graph (with and without technology), present data and draw conclusions.**  Create A Graph  <http://wdcrobcolp01.ed.gov/nces-nothome.htm>  Practice Reading A Graph  <http://www.mste.uiuc.edu/courses/ci330ms/youtsey/intro.html>  Circle Graph  <http://www.shodor.org/interactivate/activities/CircleGraph/>  Circle Graph (Pie)  <http://shodor.org/interactivate/activities/CircleGraph/> |
| **M.O.5.5.4** | **collect and analyze data using mean, median and mode to determine the best statistical measure.**  Mean, Median, Mode Quia Rags to Riches Game  <http://www.quia.com/rr/51667.html>  BBC Bitesize: Mode, Median, Mean  <http://www.bbc.co.uk/schools/ks2bitesize/maths/activities/modemedianmean.shtml> |

**6th Grade Math CSO Resources**

**General**

Who Wants to be a Millionaire? (Math and Science combined)

<http://education.jlab.org/million/>

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| **Grade 6** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.6.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.6.1.1** | **demonstrate an understanding of large numbers by converting and comparing numbers in scientific notation and standard notation (with and without technology).**  Scientific Notation  <http://www.aaamath.com/dec71i-dec2sci.html>  Quiz Me! (Interactive scientific notation quiz)  <http://www.mccc.edu/~kelld/scientific/scientific.htm>  Webmath.com (Interactive conversions)  <http://www.webmath.com/sn_convert.html>  Personal Tutor: Scientific Notation  <http://www.glencoe.com/sec/math/msmath/mac04/course2/personal_tutor/personal_tutor.php?t=MAC2_3_7_2> |
| **M.O.6.1.2** | **determine the greatest common factor and least common multiple using multiple strategies to solve real-world problems; find prime factorization of a number.**  Prime Factorization  <http://amby.com/educate/math/2-1_fact.html>  Prime Factorization  <http://www.mathnstuff.com/math/spoken/here/1words/p/p33.htm>  Factorize  <http://illuminations.nctm.org/ActivityDetail.aspx?id=64>  NLVM Factor Tree  <http://illuminations.nctm.org/ActivityDetail.aspx?id=64> |
| **M.O.6.1.3** | **compare and order integers using multiple strategies (e.g., symbols, manipulatives, number line).**  Line Jumper  <http://www.funbrain.com/linejump/>  Virtual Manipulatives - Number Line Activities  <http://matti.usu.edu/nlvm/nav/frames_asid_156_g_1_t_1.html?open=activities> |
| **M.O.6.1.4** | **analyze and solve real-world problems involving addition, subtraction , multiplication and division of**   * **whole numbers,** * **fractions, mixed numbers,** * **decimals,** * **integers, and**   **justify the reasonableness by estimation.**  Arithmetic Word Problems  <http://www.syvum.com/math/wordproblems/level1.html>  Word Problems for Kids  <http://www.stfx.ca/special/mathproblems/welcome.html>  And Around We Go! (Lesson Plan)  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/6_around.php> |
| **M.O.6.1.5** | **apply the distributive, commutative, associative and identity properties to numeric expressions and use to prove equivalency.**  Properties Summary  <http://www.purplemath.com/modules/numbprop.htm>  Factorize  <http://illuminations.nctm.org/ActivityDetail.aspx?id=64>  Patterns in Color  <http://mathforum.org/workshops/usi/pascal/hs.color_pascal.html>  Quia Square Root  <http://www.quia.com/jg/65631.html> |
| **M.O.6.1.6** | **convert between fractions/ratios, mixed numbers, decimals and percents in appropriate real-world problems.**  IXL Math  <http://www.ixl.com/math/practice/grade-5-convert-between-percents-fractions-and-decimals>  Fractions and Decimals  <http://www.aaamath.com/fra71a-fract2deci.html>  Quia Fraction Decimal Conversion Games  <http://www.quia.com/jg/65724.html>  Funbrain Double Fun Match  <http://www.funbrain.com/match2/index.html>  Fraction Four  <http://gphillips.info/first9wks_hlevel.htm>  Quia Fraction Decimal Percent Jeopardy  <http://www.quia.com/cb/34887.html>  Fraction and Decimal Matching Game  <http://www.harcourtschool.com/activity/con_math/g04c22a.html> |
| **M.O.6.1.7** | **compute the percent of a number to solve application problems and justify the reasonableness by estimation.**  AAA Math: Percent of a Number  <http://www.aaamath.com/pct61a-pctnum.html>  Percent Calculator  <http://www.marshu.com/articles/calculate-percent-with-percentage-calculator.php> |
| **M.O.6.1.8** | **demonstrate an understanding of the effect of multiplying and dividing, whole numbers, fractions and decimals by numbers including 0, 1 and values between 0 and 1 .**  Funbrain Power Football!  <http://www.funbrain.com/football/index.html>  Quia Multiplying Decimals Matching Games  <http://www.quia.com/jg/229494.html>  <http://www.quia.com/cc/229494.html>  AAA Math: Dividing Decimals  <http://www.aaamath.com/dec56a-divdeciint.html>  AAA Math: Division of Decimals by Decimal  <http://www.aaamath.com/dec56b-divdeci.html>  AAA Math: Dividing Decimals Demonstration  <http://www.aaamath.com/dec56b-divdeci.html> |
| **M.O.6.1.9** | **develop and test hypotheses to derive the rules for addition, subtraction, multiplication and division of integers, justify by using real-world examples and use them to solve problems.**  Data Collection in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=203> |
| **Grade 6** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.6.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.6.2.1** | **simplify numerical expressions and evaluate algebraic expressions using order of operations.**  Order of Operation  <http://www.funbrain.com/algebra/index.html>  Order of Operation Tutorial and Pretest  <http://amby.com/educate/ord-op/> |
| **M.O.6.2.2** | **use inductive reasoning to extend patterns to predict the nth term (e.g., powers and triangular numbers).**  Number Cracker  <http://www.funbrain.com/cracker/index.html>  What Comes Next?  <http://www.primarygames.com/patterns/start.htm>  Sequencer  <http://www.shodor.org/interactivate/activities/sequencer/index.html>  Algebra in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=242>  NLVM Pascal’s Triangle  <http://nlvm.usu.edu/en/nav/frames_asid_181_g_3_t_1.html?open=activities&from=category_g_3_t_1.html>  Hop To It Lesson Plan  <http://www-tc.pbs.org/teachers/mathline/lessonplans/pdf/atmp/HoptoIt.pdf> |
| **M.O.6.2.3** | **create algebraic expressions that correspond to real-world situations; use the expressions to solve problems.**  Changing Standard Numbers to Scientific Notation  <http://www.321know.com/g6_71fx1.htm>  Changing Scientific Notation to Standard Numbers  <http://www.321know.com/g6_71gx1.htm>  Comparing Scientific Notation and Standard Numbers  <http://www.321know.com/g6_71hx1.htm>  Algebra in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=242>  Building Bridges  <http://illuminations.nctm.org/LessonDetail.aspx?id=L247> |
| **M.O.6.2.4** | **determine the rule, output or input; given an input/output model using one operation, write an algebraic expression for the rule and use to identify other input/output values.**  Algebra in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=242> |
| **M.O.6.2.5** | **solve real-world proportion problems involving rates, probability and measurements using multiple strategies, justify selection of strategies.**  BBC Ratio and Proportion  <http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/>  Ratio/Proportions, Mean, Median, Mode  <http://www.nwlincs.org/wyGEDtran/interactive/lesson15/l15-ex1.htm> |
| **M.O.6.2.6** | **write and solve one-step equations using number sense, properties of operations and the idea of maintaining equality to represent and solve real-world problems.**  Function Machine  <http://www.shodor.org/interactivate/activities/fm/>  Evaluating an Expression with One Variable  <http://www.321know.com/g623_ex6.htm> |
| **Grade 6** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.6.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.6.3.1** | **analyze characteristics using defining properties of**   * **lines,** * **angles,** * **polygons,** * **triangles, and**   **compare these geometric figures.**  Triangle <http://www.mathleague.com/help/geometry/polygons.htm#triangle>  Polygons  <http://www.mathleague.com/help/geometry/polygons.htm#polygon>  Regular Polygon  <http://www.mathleague.com/help/geometry/polygons.htm#regularpolygon> |
| **M.O.6.3.2** | **use inductive reasoning with the measures of interior angles in polygons and derive the formula to determine the sum of the measures of the interior angles.**  Measuring Angles  <http://www.kidport.com/Grade6/Math/MeasureGeo/MeasuringAngles.htm>  Exploring Angle Sums  <http://illuminations.nctm.org/tools/tool_detail.aspx?id=9> |
| **M.O.6.3.3** | **apply the concepts of parallel, perpendicular, intersecting, and skew lines to real-world situations (i.e. roads and routes).**  Angles  <http://www.shodor.org/interactivate/activities/angles/index.html> |
| **M.O.6.3.4** | **create designs using line and rotational symmetry.**  Rotational Symmetry  <http://www.icteachers.co.uk/children/sats/rotational.htm>  BBC Bitesize: Symmetry  <http://www.bbc.co.uk/schools/ks3bitesize/maths/shape_and_space/symmetry_intro.shtml> |
| **M.O.6.3.5** | **predict, describe, and perform transformations on two-dimensional shapes**   * **translations** * **rotations** * **reflections**   Types of Symmetry  <http://mathforum.org/sum95/suzanne/symsusan.html>  Translations, Reflections, Rotations (Interactive lesson plan)  <http://www.shodor.org/interactivate/lessons/Translations/> |
| **M.O.6.3.6** | **use geometric representations to solve real-world problems.** |
| **M.O.6.3.7** | **plot polygons on coordinate grids, determine lengths and areas from the graph.**  Geometry in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=241> |
| **Grade 6** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.6.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurement, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.6.4.1** | **determine an approximation for pi using actual measurements.**  Exploring c/d = π<http://www.utdanacenter.org/mathtoolkit/instruction/lessons/6_exploring.php> |
| **M.O.6.4.2** | **develop and test hypotheses to determine formulas for**   * **perimeter of polygons, including composite figures** * **area of parallelograms** * **area of triangles** * **area of composite figures made of parallelograms and triangles** * **circumference of a circle** * **area of a circle** * **volume of a rectangular prism**   Shape Explorer  <http://www.shodor.org/interactivate/activities/perimeter/index.html>  Area Explorer  <http://www.shodor.org/interactivate/activities/perm/index.html>  Squaring the Triangle  <http://www.shodor.org/interactivate/activities/pyth/index.html>  Algebra in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=242>  Geometry in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=241>  Measurement Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=204> |
| **M.O.6.4.3** | **investigate, model and describe surface area of rectangular prisms and cylinders; develop strategies to determine the surface area of rectangular prisms.**  Shape Explorer  <http://www.shodor.org/interactivate/activities/perimeter/index.html>  Area Explorer  <http://www.shodor.org/interactivate/activities/perm/index.html>  Algebra in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=242>  Measurement Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=204> |
| **M.O.6.4.4** | **develop strategies to determine volume of cylinders; solve real-world problems involving volume of cylinders, justify the results.**  AAA Math: Volume of a Cylinder  <http://www.321know.com/geo79_x5.htm>  Brain Pop: Volume of Cylinders (Subscription based, but has FREE trial version)  <http://www.brainpop.com/math/geometryandmeasurement/volumeofcylinders/preview.weml> |
| **M.O.6.4.5** | **given a two-dimensional polygon, construct a scale drawing given the scale factor.**  Ratio-Scale Drawings  <http://www.indiana.edu/~atmat/units/ratio/ratio_s4.htm>  Glenco Study Tools  <http://www.glencoe.com/sec/math/studytools/cgi-bin/msgQuiz.php4?isbn=0-02-833050-1&chapter=8&lesson=3>  Measurement Relationships  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=204> |
| **Grade 6** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.6.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.6.5.1** | **collect, organize, display, read, interpret and analyze real-world data using appropriate graphs and tables (with and without technology).**  Create a Graph  <http://nces.ed.gov/nceskids/graphing/index.asp>  Data Interpretation Games  <http://www.gamequarium.com/data.html>  Data Collection in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=106&tsele3i=203> |
| **M.O.6.5.2** | **identify a real life situation using statistical measures (mean, median, mode, range, outliers) overtime, make a hypothesis as to the outcome; design and implement a method to collect, organize and analyze data; analyze the results to make a conclusion; evaluate the validity of the hypothesis based upon collected data, design a mode of presentation using words, graphs, models, and/or tables (with and without technology).**  Mean and Medium (This applet allows the user to investigate the mean, median, and box-and-whisker plot for a set of data that they create. The data set may contain up to 15 integers, each with a value from 0 to 100.)  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=160> |
| **M.O.6.5.3** | **perform simple probability events using manipulatives; predict the outcome given events using experimental and theoretical probability; express experimental and theoretical probability as a ratio, decimal or percent.**  Probability  <http://www.shodor.org/interactivate/activities/prob/index.html>  Interactive Math  <http://www.cut-the-knot.org/probability.shtml> |
| **M.O.6.5.4** | **determine combinations and permutations of given real-world situations by multiple strategies, including creating lists.**  Combinations and Permutations (Differences explained)  <http://www.mathsisfun.com/combinatorics/combinations-permutations.html>  Combinations and Permutations Calculator  <http://www.mathsisfun.com/combinatorics/combinations-permutations-calculator.html> |

**7th Grade Math Resources**

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| **Grade 7** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.7.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.7.1.1** | **compare, order, and differentiate among integers, decimals, fractions, and irrational numbers using multiple representations (e.g., symbols, manipulatives, graphing on a number line).**  Percent  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=54>  Plus or Minus (Integers)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2564>  Cuisenaire Kid’s (Adding/Subtracting/Graphing Integers)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=1534>  Fraction Model 1 (View decimal Equivalents and explore representations for fractions)  <http://illuminations.nctm.org/ActivityDetail.aspx?id=11>  Fraction Model 2  <http://illuminations.nctm.org/ActivityDetail.aspx?id=44>  Fraction Model 3  <http://illuminations.nctm.org/ActivityDetail.aspx?id=45>  The Price of Relief (They add, subtract, multiply, and divide whole numbers, fractions, decimals, integers, and rational numbers; and select and use appropriate computational methods for a given situation.)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=1812>  Fraction Game  <http://illuminations.nctm.org/ActivityDetail.aspx?id=18>  Create a Graph  <http://nces.ed.gov/nceskids/createagraph/>  Compare Fractions  <http://www.webmath.com/k8cf.html> |
| **M.O.7.1.2** | **model the relationship between perfect squares and square roots using physical representations; estimate square root and evaluate using technology.**  Purple Math  <http://www.purplemath.com/modules/radicals.htm>  October Calendar (Click the words to open PDF: Square Roots)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=3194>  Mathematical Scavenger Hunt (Click the words to open PDF: Square Roots)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2843> |
| **M.O.7.1.3** | **using simple computation and problem-solving situations, demonstrate fluency and justify solutions in performing operations with rational numbers including negative numbers for**   * **adding** * **subtracting** * **multiplying** * **dividing**   Percent  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=54>  Volt Meter  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=152>  Line Jumper  <http://www.funbrain.com/linejump/index.html>  Order of Operations  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L730>  Divide and Conquer (Lesson Plan)  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/7_divide.php>  Understanding Rational Numbers (Lesson Plan)  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L284>  Adding Integers  <http://www.mathwizz.com/integers/page1.htm> |
| **M.O.7.1.4** | **justify the use of the commutative, associative, distributive, identity and inverse properties to simplify numeric expressions.**  Properties Summary  <http://www.purplemath.com/modules/numbprop.htm>  Factorize  <http://illuminations.nctm.org/ActivityDetail.aspx?id=64>  Patterns in Color  <http://mathforum.org/workshops/usi/pascal/hs.color_pascal.html>  Quia Square Root  <http://www.quia.com/jg/65631.html>  Using Algebra to Solve (Geometry/Measurement) Problems  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=48>  AAA Math Properties  <http://www.321know.com/pro.htm> |
| **M.O.7.1.5** | **analyze and solve grade-appropriate real-world problems with whole numbers, integers, decimals, fractions and percents including problems involving**   * **discounts,** * **interest,** * **taxes,** * **tips,** * **percent increase or decrease, and**   **justify solutions including using estimation and reasonableness.**  Percent  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=54>  Plus or Minus (Integers)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2564>  Mean and Medium (This applet allows the user to investigate the mean, median, and box-and-whisker plot for a set of data that they create. The data set may contain up to 15 integers, each with a value from 0 to 100.)  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=160>  Cuisenaire Kid’s (Adding/Subtracting/Graphing Integers)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=1534>  Fraction Model 1 (View decimal Equivalents and explore representations for fractions)  <http://illuminations.nctm.org/ActivityDetail.aspx?id=11>  Fraction Model 2  <http://illuminations.nctm.org/ActivityDetail.aspx?id=44>  Fraction Model 3  <http://illuminations.nctm.org/ActivityDetail.aspx?id=45>  The Price of Relief (They add, subtract, multiply, and divide whole numbers, fractions, decimals, integers, and rational numbers; and select and use appropriate computational methods for a given situation.)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=1812>  Fraction Game  <http://illuminations.nctm.org/ActivityDetail.aspx?id=18>  Alphabits (Lesson Plan)  <http://www-tc.pbs.org/teachers/mathline/lessonplans/pdf/msmp/alphabits.pdf>  Math at the Mall  <http://www.mathplayground.com/mathatthemall2.html> |
| **M.O.7.1.6** | **use inductive reasoning to find and justify the laws of exponents with numeric bases.**  Quia Scientific Notation 14C  <http://www.quia.com/pop/50485.html>  Balancing Exponents  <http://illuminations.nctm.org/Lessons/EveryBalance/Balance-AS-Exponents.pdf>  Predicting your Financial Future  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L761> |
| **M.O.7.1.7** | **solve problems using numbers in scientific notation (positive and negative exponents) with and without technology, and interpret from real life contexts.**  Scientific Notation Problem Generator  <http://www.edinformatics.com/math_science/scinot6.htm>  Scientific Notation Webquest  <http://www.mathgoodies.com/webquests/scientific_notation/>  Scientific Notation (PPT)  <http://www.authorstream.com/presentation/sandio55-129568-scientific-notation-mathematics-sci-20not-1-education-ppt-powerpoint/> |
| **Grade 7** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.7.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contents.** |
| **M.O.7.2.1** | **use inductive reasoning to find missing elements in a variety of arithmetic and geometric patterns including algebraic sequences and series.**  Purple Math  <http://www.purplemath.com/modules/series3.htm>  Interactive Arithmetic and Geometric Pattern Lesson  <http://www.shodor.org/interactivate/lessons/IntroArithmetic/>  A Grain of Rice Lesson  <http://www.knowledge.state.va.us/cgi-bin/lesview.cgi?idl=139> |
| **M.O.7.2.2** | **evaluate algebraic expressions with whole numbers, integers, absolute value and exponents using the order of operations.**  Using Algebra to Solve (Geometry/Measurement) Problems  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=48> |
| **M.O.7.2.3** | **solve problems by creating an input/output function table(including, but not limited to, spreadsheets) to predict future values, given a real-world situation involving rational numbers.**  Using Algebra to Solve (Geometry/Measurement) Problems  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=48> |
| **M.O.7.2.4** | **analyze proportional relationships in real-world situations, select an appropriate method to determine the solution and justify reasoning for choice of method to solve.**  Proportions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=47> |
| **M.O.7.2.5** | **solve one-step linear equations and inequalities using a variety of strategies containing rational numbers with integer solutions; graph solutions, and justify the selection of the strategy and the reasonableness of the solution.**  Function Machine  <http://shodor.org/interactivate/activities/FunctionMachine/> |
| **M.O.7.2.6** | **plot lines within the Cartesian coordinate plane from a table of values to solve mathematical real-world problems.**  Cartesian from Shodor  <http://www.shodor.org/interactivate/lessons/CartesianCoordinate/>  Picture Math  <http://teachersnetwork.org/ntol/lessons/picturemath/>  Reading Graphs  <http://www.shodor.org/interactivate/lessons/ReadingGraphs/>  Catch the Fly  <http://hotmath.com/hotmath_help/games/ctf/ctf_hotmath.swf>  Haunted House  <http://www.themathlab.com/Pre-Algebra/graphing/hauntedhouse.htm>  Maze Game  <http://shodor.org/interactivate/activities/MazeGame/> |
| **M.O.7.2.7** | **determine the slope of a line from its graphical representation.**  Slope of A Straight Line  <http://www.purplemath.com/modules/slope.htm>  Rise Run Triangles  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L728>  Slope Pi and Lines (Upper level)  <http://illuminations.nctm.org/Lessons/PiLine/PiLine-OVH-Slope.pdf>  Slope Slider  <http://www.shodor.org/interactivate/activities/SlopeSlider/> |
| **M.O.7.2.8** | **represent algebraically and solve real-world application problems and justify solutions.**  Using Algebra to Solve (Geometry/Measurement) Problems  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=48> |
| **M.O.7.2.9** | **identify a real life problem involving proportionality; make a hypothesis as to the outcome; develop, justify, and implement a method to collect, organize, and analyze data; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project using words, graphs, drawings, models, or tables.**  Proportions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=47>  Interactive Video  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/4_Line_Symmetry/index.html>  Symmetry  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/4_Line_Symmetry/index.html> |
| **Grade 7** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.7.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will:**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.7.3.1** | **identify and construct**   * **angle-pairs adjacent, complementary, supplementary, vertical** * **congruent segments and angles** * **perpendicular bisectors of segments** * **angle-bisectors** |
| **M.O.7.3.2** | **apply line symmetry to classify plane figures.**  Plane Figure Symmetry  <http://www.math123xyz.com/Nav/Basic_Skills/Symmetry.php>  Symmetric Plane Figures PPT  <http://www.mathslideshow.com/Math5/Lesson25-6/index.htm>  From the Ground Up  <http://74.125.45.132/search?q=cache:ahJ1ZkMOfTwJ:wvde.state.wv.us/intel/sample_units/grade_7-9_from_the_ground_up-geometry_measure.doc+compound+geometric+figures&hl=en&ct=clnk&cd=23&gl=us>  Understanding Congruence, Similarity, and Symmetry Using Transformations and Interactive Figures (Lesson Plan)  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U134> |
| **M.O.7.3.3** | **apply rotations, reflections, translations to plane figures and determine the coordinates of its transformation and compare and contrast the new figure with the original.**  Understanding Congruence, Similarity, and Symmetry Using Transformations and Interactive Figures (Lesson Plan)  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U134>  Flips, Slides, and Turns  <http://school.eb.com/lm/manipulatives/enu/workspaces/transformations_isometry/product.html>  Alphabet Geometry  <http://www.misterteacher.com/abc.html> |
| **M.O.7.3.4** | **pose and solve ratio and proportion problems including scale drawings and similar polygons.**  Proportions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=47>  Body Measurements  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L659>  Finger Length  <http://www.sciencenetlinks.com/sci_update.cfm?DocID=260>  Linking Length, Perimeter, Area, and Volume  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L260>  Capture Recapture  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L721>  Paper Pool  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U165>  From the Ground Up  <http://74.125.45.132/search?q=cache:ahJ1ZkMOfTwJ:wvde.state.wv.us/intel/sample_units/grade_7-9_from_the_ground_up-geometry_measure.doc+compound+geometric+figures&hl=en&ct=clnk&cd=23&gl=us>  Pipe Cleaners (Lesson Plan)  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/7_pipe.php>  Bean Counting and Ratios  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L722> |
| **M.O.7.3.5** | **solve problems and explain the relationships among scale factor and area and volume including**   * **square of a scale factor** * **cube of a scale factor**   Proportions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=47>  Scale Factor  <http://illuminations.nctm.org/Lessons/Scaling/Scaling-OVH-Scale.pdf>  Scale Away  <http://illuminations.nctm.org/Lessons/Scaling/Scaling-AS-ScalingAway.pdf>  Area Formulas  <http://illuminations.nctm.org/LessonDetail.aspx?ID=U160>  Area of Triangle  <http://illuminations.nctm.org/ActivityDetail.aspx?id=48>  Area of Parallelogram  <http://illuminations.nctm.org/ActivityDetail.aspx?id=47>  Area of Rectangle  <http://illuminations.nctm.org/ActivityDetail.aspx?id=46>  Area Tool  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=108>  Surface Area and Volume  <http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/>  Dimension and Scale Information  <http://www.shodor.org/interactivate/discussions/DimensionAndScale/>  Cube/Rectangular Prism Lesson  <http://mathforum.org/alejandre/escot/cube.prism.html>  From the Ground Up  <http://74.125.45.132/search?q=cache:ahJ1ZkMOfTwJ:wvde.state.wv.us/intel/sample_units/grade_7-9_from_the_ground_up-geometry_measure.doc+compound+geometric+figures&hl=en&ct=clnk&cd=23&gl=us> |
| **M.O.7.3.6** | **solve mathematical real-world problems using compound geometric figures.**  Using Algebra to Solve (Geometry/Measurement) Problems  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=48>  From the Ground Up  <http://74.125.45.132/search?q=cache:ahJ1ZkMOfTwJ:wvde.state.wv.us/intel/sample_units/grade_7-9_from_the_ground_up-geometry_measure.doc+compound+geometric+figures&hl=en&ct=clnk&cd=23&gl=us> |
| **Grade 7** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.7.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will:**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurements, and** * **apply appropriate techniques, tools and formulas to determine measurements.** |
| **M.O.7.4.1** | **select and apply an appropriate method to solve (including, but not limited to, formulas) justify the method and the reasonableness of the solution, given a real-world problem solving situation involving**   * **perimeter** * **circumference** * **area** * **surface area of prisms (rectangular and triangular)** * **volume of prisms and cylinders** * **distance and temperature (Celsius, Fahrenheit )**   Math League  <http://www.mathleague.com/help/geometry/area.htm>  Using Algebra to Solve (Geometry/Measurement) Problems  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=48>  Shape Explorer  <http://www.shodor.org/interactivate/activities/ShapeExplorer/> |
| **M.O.7.4.2** | **use the Pythagorean Theorem to find the length of any side of a right triangle and apply to problem solving situations.**  Demonstrate the Theorem  <http://www.pbs.org/wgbh/nova/proof/puzzle/theorem.html>  Using Algebra to Solve (Geometry/Measurement) Problems  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=48>  Pythagorean Theorem Slide Show  <http://www.wisc-online.com/objects/index_tj.asp?objID=ABM1501>  Pythagorean Theorem Video (Being Taught)  <http://www.learner.org/courses/learningmath/geometry/session6/video.html>  Demonstrate Pythagorean Theorem  <http://www.pbs.org/wgbh/nova/proof/puzzle/theorem.html>  Prove Pythagorean Theorem Yourself!  <http://www.mathsisfun.com/pythagoras.html>  Pythagorean Theorem Tips  <http://www.arcytech.org/java/pythagoras/> |
| **M.O.7.4.3** | **convert units of measurement, linear, area and volume, within customary and metric systems.**  Links Learning  http://www.linkslearning.org/Kids/1\_Math/2\_Illustrated\_Lessons/6\_Weight\_and\_Capacity/index.html  Length  <http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/2_Estimation_of_Length/index.html>  Internet 4 Classrooms: 7th grade (Scroll down to measurement)  <http://www.internet4classrooms.com/skills_7th_original.htm> |
| **Grade 7** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.7.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will:**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability** |
| **M.O.7.5.1** | **determine theoretical probability of an event, make and test predictions through experimentation.**  Proportions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=47>  Random Drawing Tool  <http://illuminations.nctm.org/ActivityDetail.aspx?id=67>  Marble Mania  <http://www.sciencenetlinks.com/afterschool/marbles/student.html>  Fire  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=143> |
| **M.O.7.5.2** | **determine combinations and permutations by constructing sample spaces (e.g., listing, tree diagrams, frequency distribution tables).**  Combinations and Permutations (Notes differences)  <http://www.mathsisfun.com/combinatorics/combinations-permutations.html>  Combinations and Permutations Calculator  <http://www.mathsisfun.com/combinatorics/combinations-permutations-calculator.html>  Tree Diagram Organizers  <http://www.enchantedlearning.com/graphicorganizers/tree/> |
| **M.O.7.5.3** | **collect, organize, graphically represent, and interpret data displays including frequency distributions, line-plots, scatter plots, box and whiskers, and multiple-line graphs.**  Graphic Representation  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=36>  M&M Candies, Line Plots, and Graphing  <http://score.kings.k12.ca.us/lessons/mandm.html>  Mini Lessons  <http://www.tustin.k12.ca.us/cyberseminar/lineplot.htm>  Line Plot Lessons, &, Practice Sheets & Quiz  <http://www.mathworksheetscenter.com/mathskills/graphing/lineplots/>  Fire Probability and Chaos  <http://www.shodor.org/interactivate/lessons/FireProbabilityChaos/>  Graphing Jeopardy  <http://www.quia.com/cb/16313.html>  Fun and Sun Rent a Car  <http://math.rice.edu/~lanius/Algebra/rentacar.html>  Using NBA Statistics for Box and Whiskers Plots  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L737>  West Virginia Mountaineers: Men’s Basketball News  <http://www.msnsportsnet.com/page.cfm?sport=mbball&show=roster> |
| **M.O.7.5.4** | **analyze and solve application problems involving measures of central tendency (mean, median, mode) and dispersion (range) from data, graphs, tables, and experiments using appropriate technology to compare two sets of data.**  Graphic Representation  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=107&tsele3i=36>  Who Bats Better?  <http://library.thinkquest.org/3453/less_act/m_bball.html>  Purple Math  <http://www.purplemath.com/modules/meanmode.htm>  Rags to Riches  <http://www.quia.com/rr/51667.html>  Comparing Mean and Median  <http://standards.nctm.org/document/eexamples/chap6/6.6/index.htm> |

**8th Grade Math Resources**

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| **Grade 8** | **Mathematics** |
| **Standard 1** | **Number and Operations** |
| **M.S.8.1** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of numbers, ways of representing numbers, and relationships among numbers and number systems,** * **demonstrate meanings of operations and how they relate to one another, and** * **compute fluently and make reasonable estimates.** |
| **M.O.8.1.1** | **analyze, describe and compare the characteristics of rational and irrational numbers.**  Fact Monster  <http://www.factmonster.com/ipka/A0876704.html>  Prize Numbers (Rational Numbers)  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=1755> |
| **M.O.8.1.2** | **analyze and solve application problems with**   * **powers,** * **squares,** * **square roots,** * **scientific notation, and**   **verify solutions using estimation techniques.** |
| **M.O.8.1.3** | **analyze and solve grade-appropriate real-world problems with**   * **whole numbers,** * **decimals,** * **fractions,** * **percents, percent increase and decrease,** * **integers, and**   **including, but not limited to, rates, tips, discounts, sales tax and interest and verify solutions using estimation techniques.** |
| **Grade 8** | **Mathematics** |
| **Standard 2** | **Algebra** |
| **M.S.8.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.8.2.1** | **use a variety of strategies to solve one and two-step linear equations and inequalities with rational solutions; defend the selection of the strategy; graph the solutions and justify the reasonableness of the solution.** |
| **M.O.8.2.2** | **identify proportional relationships in real-world situations, then find and select an appropriate method to determine the solution; justify the reasonableness of the solution.**  Geometry  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=226>  Perplexing Puzzle (Lesson Plan)  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/8_puzzle.php> |
| **M.O.8.2.3** | **add and subtract polynomials limited to two variables and positive exponents.** |
| **M.O.8.2.4** | **use systems of linear equations to analyze situations and solve problems.** |
| **M.O.8.2.5** | **apply inductive and deductive reasoning to write a rule from data in an input/output table, analyze the table and the rule to determine if a functional relationship exists.**  Algebraic Patterns and Representation  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=200>  Making Connections  <http://www.utdanacenter.org/mathtoolkit/instruction/lessons/8_connections.php>  Function Machine  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=3206> |
| **M.O.8.2.6** | **graph linear equations and inequalities within the Cartesian coordinate plane by generating a table of values (with and without technology).** |
| **M.O.8.2.7** | **formulate and apply a rule to generate an arithmetic, geometric and algebraic pattern.**  Algebraic Patterns and Representation  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=200>  Patterns in Color  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=200>  Double or Not?  <http://www.figurethis.org/challenges/c07/challenge.htm>  Play with Lulu  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=197> |
| **M.O.8.2.8** | **determine the slope of a line using a variety of methods including**   * **graphing** * **change in y over change in x** * **equation**   Slope  <http://www.purplemath.com/modules/slope.htm>  Lines and Slopes  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2931> |
| **M.O.8.2.9** | **represent and solve real-world grade-appropriate problems using multiple strategies and justify solutions.** |
| **M.O.8.2.10** | **identify a real life problem involving change over time; make a hypothesis as to the outcome; develop, justify, and implement a method to collect, organize, and analyze data; generalize the results to make a conclusion; compare the hypothesis and the results of the investigation; present the project using words, graphs, drawings, models, or tables.**  Algebraic Patterns and Representation  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=200>  The Hot Tub  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=1722>  Play Ball  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2368> |
| **Grade 8** | **Mathematics** |
| **Standard 3** | **Geometry** |
| **M.S.8.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will:**   * **analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformation and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.8.3.1** | **justify the relationships among corresponding, alternate interior, alternate exterior and vertical angles when parallel lines are cut by a transversal using models, pencil/paper, graphing calculator, and technology.** |
| **M.O.8.3.2** | **classify polyhedrons according to the number and shape of faces; use inductive reasoning to determine the relationship between vertices, faces and edges (edges + 2 = faces + vertices).**  Studying Polyhedra  <http://mathforum.org/alejandre/applet.polyhedra.html>  Geometric Solids  <http://illuminations.nctm.org/ActivityDetail.aspx?id=70> |
| **M.O.8.3.3** | **identify, apply, and construct perpendicular and angle bisectors with and without technology ) given a real-world situation.** |
| **M.O.8.3.4** | **create geometric patterns including tiling, art design, tessellations and scaling using transformations (rotations, reflections, translations) and predict results of combining, subdividing, and changing shapes of plane figures and solids.**  14C Geometric Spatial Sense (scroll down to section 8)  <http://www.internet4classrooms.com/skills_8th_original.htm>  Shape Tool  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=35>  Tessellations  <http://www.tessellations.com/>  Teaching Tessellations  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2746>  Scale Factor  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=176> |
| **M.O.8.3.5** | **create scale models of similar figures using ratio, proportion with pencil/paper and technology and determine scale factor.**  Geometry  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=226>  The Golden Ratio  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=277>  Which Tastes Juicier?  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=655>  Leonardo da Vinci  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2439>  Scale Factor  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=176>  Bean Counting and Ratios  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L722> |
| **M.O.8.3.6** | **make and test a conjecture concerning**   * **regular polygons,** * **the cross section of a solid such as a cylinder, cone, and pyramid,** * **the intersection of two or more geometric figures in the plane (e.g., intersection of a circle and a line), and**   **justify the results.** |
| **Grade 8** | **Mathematics** |
| **Standard 4** | **Measurement** |
| **M.S.8.4** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of measurable attributes of objects and the units, systems, and processes of measurements, and** * **apply appropriate techniques, tools, and formulas to determine measurements.** |
| **M.O.8.4.1** | **select and apply an appropriate method to solve; justify the method and the reasonableness of the solution of problems involving volume of**   * **prisms** * **cylinders** * **cones** * **pyramids** * **spheres**   **given real-world problem solving situations.**  Three Dimensional Measurement in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=193>  Surface Area and Volume  <http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/>  Fill It Up!  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2046>  Building A Pyramid  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2437> |
| **M.O.8.4.2** | **solve problems involving missing measurements in plane and solid geometric figures using formulas and drawings including irregular figures, models or definitions.**  Geometry  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=226>  Three Dimensional Measurement in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=193> |
| **M.O.8.4.3** | **solve right triangle problems where the existence of triangles is not obvious using the Pythagorean Theorem and indirect measurement in real-world problem solving situations.**  Three Dimensional Measurement in the 21st Century  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=193>  Pythagorean Puzzle  <http://www.pbs.org/wgbh/nova/proof/puzzle/> |
| **Grade 8** | **Mathematics** |
| **Standard 5** | **Data Analysis and Probability** |
| **M.S.8.5** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will:**   * **formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them,** * **select and use appropriate statistical methods to analyze data,** * **develop and evaluate inferences and predictions that are based on models, and** * **apply and demonstrate an understanding of basic concepts of probability.** |
| **M.O.8.5.1** | **determine and explain whether a real-world situation involves permutations or combinations, then use appropriate technology to solve the problem.** |
| **M.O.8.5.2** | **compare the experimental and theoretical probability of a given situation (including compound probability of a dependent and independent event).** |
| **M.O.8.5.3** | **create and extrapolate information from multiple-bar graphs, box and whisker plots, and other data displays using appropriate technology.**  Purple Math  <http://www.purplemath.com/modules/boxwhisk.htm>  Regents Prep  <http://regentsprep.org/regents/math/data/boxwhisk.htm>  Collecting and Analyzing Data  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=223>  Mean and Median  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=160>  Using NBA Statistics for Box and Whiskers Plots  <http://illuminations.nctm.org/LessonDetail.aspx?ID=L737>  West Virginia Mountaineers: Men’s Basketball News  <http://www.msnsportsnet.com/page.cfm?sport=mbball&show=roster> |
| **M.O.8.5.4** | **analyze problem situations, games of chance, and consumer applications using random and non-random samplings to determine probability, make predictions, and identify sources of bias.**  Collecting and Analyzing Data  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=223>  Random Drawing Tool  <http://illuminations.nctm.org/ActivityDetail.aspx?id=67>  Adjustable Spinner  <http://illuminations.nctm.org/ActivityDetail.aspx?id=79>  Marble Mania  <http://www.sciencenetlinks.com/afterschool/marbles/student.html>  Marble Mania Facilitator Page  <http://www.sciencenetlinks.com/afterschool/marbles/facilitator.html>  Marble Mania Student Activity Sheet  <http://www.sciencenetlinks.com/afterschool/marbles/facilitator.html>  Sticks and Stones  <http://illuminations.nctm.org/Lessons/Sticks/Sticks-Demo.html>  Fire!  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=143> |
| **M.O.8.5.5** | **draw inferences, make conjectures and construct convincing arguments involving**   * **different effects that changes in data values have on measures of central tendency**  misuses of statistical or numeric information, based on data analysis of same and different sets of data. Algebraic Patterns and Representation  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=200>  Collecting and Analyzing Data  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=223>  Geometry  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=108&tsele3i=226> |

**Algebra 1**

**General**

Great website hosting so, so many math interactive activities

<http://www.cut-the-knot.org/Curriculum/index.shtml>

Resources Mapped to the WESTEST Item Analysis Mathematics Grade 10 SAS in School Curriculum Pathways

[http://www.sasinschool.com](http://www.sasinschool.com/)

**Online Activities (First Quarter)**

Algebra I Online Unit 1 Lesson 9: Constant Area Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/ConstantArea/index.html>

Algebra I Online Unit 2 Lesson 6: What’s My Slope? Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/match/index.html>

[Match Graphs, Tables, and Equations](http://jamesrahn.com/Algebra/match_graphs_tables_equations.htm)

Relationships Between Lines

<http://jamesrahn.com/Algebra/relationships_between_lines.htm>

Absolute Value and Functions

<http://jamesrahn.com/Algebra/learning_how_absolute_value_changes_a_function.htm>

Writing Equations to Fit Number Patterns

<http://jamesrahn.com/Algebra/writing_equations_to_fit_number_patterns.htm>

Slope Activity – 1

<http://jamesrahn.com/Algebra/understanding_slope1.htm>

Slope Activity - 2

<http://jamesrahn.com/Algebra/understanding_slope2.htm>

**Online Activities (Second Quarter)**

Algebra I Online Unit 3 Lesson 5: Circle Diameter Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/CircleDiameter/index.html>

Algebra I Online Unit 3 Lesson 6: Lemonade Stand Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/Lemonade/index.html>

**Online Activities (Third Quarter)**

Algebra I Online Unit 4 Lesson 12: The Garden Problem Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/Garden/index.html>

Algebra I Online Unit 5A Lesson 3: Does That Data Fit? Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/Garden/index.html>

Algebra I Online Unit 5A Lesson 4: Is That a Good Fit? Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/Fit/index.html>

**Online Activities (Fourth Quarter)**

Algebra I Online Unit 6: Gas Law Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/GasLaw/index.html>

Algebra I Online Unit 7 Lesson 5: Bouncing Ball Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/BouncingBall/index.html>

Algebra I Online Unit 7 Lesson 7: Circle Area Applet

<http://boe.faye.k12.wv.us/FC%20Website/Algebra1/CircleArea/index.html>

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| **Grade 9-12** | **Mathematics: Algebra I** |
| **Standard 2** | **Algebra** |
| **M.S.A1.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.A1.2.1** | **formulate algebraic expressions for use in equations and inequalities that require planning to accurately model real-world problems.**  Equations and Inequalities  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=46>  Pan Balance – Expressions  <http://illuminations.nctm.org/ActivityDetail.aspx?id=10>  Quick Math  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=423> |
| **M.O.A1.2.2** | **create and solve multi-step linear equations, absolute value equations, and linear inequalities in one variable, (with and without technology); apply skills toward solving practical problems such as distance, mixtures or motion and judge the reasonableness of solutions.**  Equations and Inequalities  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=46>  Airfares  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2364>  Call Me  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=4309>  Looking at Statistics through Circles  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2452> |
| **M.O.A1.2.3** | **evaluate data provided, given a real-world situation, select an appropriate literal equation and solve for a needed variable.**  Equations and Inequalities  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=46> |
| **M.O.A1.2.4** | **develop and test hypotheses to derive the laws of exponents and use them to perform operations on expressions with integral exponents.** |
| **M.O.A1.2.5** | **analyze a given set of data and prove the existence of a pattern numerically, algebraically and graphically, write equations from the patterns and make inferences and predictions based on observing the pattern.** |
| **M.O.A.1.2.6** | **determine the slope of a line through a variety of strategies (e.g. given an equation or graph).** |
| **M.O.A1.2.7** | **analyze situations and solve problems by determining the equation of a line given a graph of a line, two points on the line, the slope and a point, or the slope and y intercept.** |
| **M.O.A1.2.8** | **identify a real life situation that involves a constant rate of change; pose a question; make a hypothesis as to the answer; develop, justify, and implement a method to collect, organize, and analyze related data; extend the nature of collected, discrete data to that of a continuous linear function that describes the known data set; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project numerically, analytically, graphically and verbally using the predictive and analytic tools of algebra (with and without technology).**  Lines and Rates of Change  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=92>  The Hot Tub  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=524>  Stressed Out  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2838> |
| **M.O.A1.2.9** | **create and solve systems of linear equations graphically and numerically using the elimination method and the substitution method, given a real-world situation.**  Systems of Linear Equations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=55>  Airfares  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2364> |
| **M.O.A1.2.10** | **simplify and evaluate algebraic expressions**   * **add and subtract polynomials** * **multiply and divide binomials by binomials or monomials** |
| **M.O.A1.2.11** | **create polynomials to represent and solve problems from real-world situations while focusing on symbolic and graphical patterns.** |
| **M.O.A1.2.12** | **use area models and graphical representations to develop and explain appropriate methods of factoring.** |
| **M.O.A1.2.13** | **simplify radical expressions**   * **through adding, subtracting, multiplying and dividing** * **exact and approximate forms** |
| **M.O.A1.2.14** | **choose the most efficient method to solve quadratic equations by**   * **graphing (with and without technology),** * **factoring** * **quadratic formula**   **and draw reasonable conclusions about a situation being modeled.** |
| **M.O.A1.2.15** | **describe real life situations involving exponential growth and decay equations including y=2x and y=(½)x; compare the equation with attributes of an associated table and graph to demonstrate an understanding of their interrelationship.** |
| **M.O.A1.2.16** | **simplify and evaluate rational expressions**   * **add, subtract, multiply and divide** * **determine when an expression is undefined.** |
| **M.O.A1.2.17** | **perform a linear regression (with and without technology),**   * **compare and evaluate methods of fitting lines to data.** * **identify the equation for the line of regression,** * **examine the correlation coefficient to determine how well the line fits the data** * **use the equation to predict specific values of a variable.**   Data Analysis  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=151>  Lines and Rates of Change  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=92>  Linear Regression  <http://illuminations.nctm.org/ActivityDetail.aspx?id=82>  Imperfect Prediction  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2851> |
| **M.O.A1.2.18** | **compute and interpret the expected value of random variables in simple cases using simulations and rules of probability (with and without technology).** |
| **M.O.A1.2.19** | **gather data to create histograms, box plots, scatter plots and normal distribution curves and use them to draw and support conclusions about the data.**  Data Analysis  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=116&tsele3i=151>  Histogram Tool  <http://illuminations.nctm.org/ActivityDetail.aspx?id=78>  High School Operations Research: Torn Shirts Inc.  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=4360>  Letter Frequency Analysis Calculator  <http://www.wiley.com/college/mat/gilbert139343/java/java11_s.html>  Histogram  <http://nlvm.usu.edu/en/nav/frames_asid_145_g_4_t_5.html?open=instructions>  Box Plotter  <http://illuminations.nctm.org/ActivityDetail.aspx?id=77>  Mean and Median  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=160>  Line of Best Fit  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=146>  Linear Regression  <http://illuminations.nctm.org/ActivityDetail.aspx?id=82>  Imperfect Prediction  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2851>  Mrs. Reddy’s Stock Webquest  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2416> |
| **M.O.A1.2.20** | **design experiments to model and solve problems using the concepts of sample space and probability distribution.** |
| **M.O.A1.2.21** | **use multiple representations, such as words, graphs, tables of values and equations, to solve practical problems; describe advantages and disadvantages of the use of each representation.** |

**Geometry**

**General**

Great website hosting so, so many math interactive activities

<http://www.cut-the-knot.org/Curriculum/index.shtml>

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| **Grade 9-12** | **Mathematics: Geometry and Applied Geometry** |
| **Standard 3** | **Geometry** |
| **M.S.G.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.G.3.1** | **represent geometric figures, such as points, lines, planes, segments, rays, and angles pictorially with proper identification and distinguish between undefined and defined terms.** |
| **M.O.G.3.2** | **differentiate and apply inductive and deductive reasoning, justify conclusions in real-world settings.** |
| **M.O.G.3.3** | **use the basic concepts of symbolic logic including identifying the converse, inverse, and contrapositive of a conditional statement and test the validity of conclusions with methods that include Venn Diagrams.** |
| **M.O.G.3.4** | **validate conclusions by constructing logical arguments using both formal and informal methods with direct and indirect reasoning.** |
| **M.O.G.3.5** | **construct formal and informal proofs by applying definitions, theorems, and postulates related to such topics as**   * **complementary,** * **supplementary,** * **vertical angles,** * **angles formed by perpendicular lines, and**   **justify the steps.** |
| **M.O.G.3.6** | **compare and contrast the relationships between angles formed by two lines cut by a transversal when lines are parallel and when they are not parallel, and use the results to develop concepts that will justify parallelism.**  Parallel and Perpendicular Lines on a Coordinate Plane 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=216>  Perpendicular Lines  <http://illuminations.nctm.org/ActivityDetail.aspx?id=50>  Geometry Dictionary: Lines in Geometry  <http://illuminations.nctm.org/ActivityDetail.aspx?id=22> |
| **M.O.G.3.7** | **make conjectures and justify congruence relationships with an emphasis on triangles and employ these relationships to solve problems.**  Triangles & Circles Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=35>  Algebra and Calculus Via Sketchpad  <http://mathforum.org/sum95/ruth/sketches/algcalc.sketches.html>  Cutting Corners  <http://illuminations.nctm.org/ActivityDetail.aspx?id=7>  Congruence Theorems  <http://illuminations.nctm.org/ActivityDetail.aspx?id=4>  Rotated Right Triangle  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2558> |
| **M.O.G.3.8** | **identify general properties of and compare and contrast the properties of convex and concave quadrilaterals**   * **parallelograms** * **rectangles** * **rhombuses** * **squares** * **trapezoids** |
| **M.O.G.3.9** | **identify a real life situation that involves similarity in two or three dimensions; pose a question; make a hypothesis as to the answer, develop, justify, and implement a method to collect, organize, and analyze related data; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project numerically, analytically, graphically and verbally using the predictive and analytic tools of algebra and geometry (with and without technology).**  Other Polygons and Polyhedrons Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=38> |
| **M.O.G.3.10** | **investigate measures of angles and lengths of segments to determine the existence of a triangle (triangle inequality) and to establish the relationship between the measures of the angles and the length of the sides (with and without technology).**  Triangles & Circles Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=35>  Car Storm Chaser  <http://illuminations.nctm.org/ActivityDetail.aspx?id=42>  Types of Angles  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=189>  Angles  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2185>  FAQ About Trigonometry  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2465>  Water to the Max  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2453> |
| **M.O.G.3.11** | **verify and justify the basis for the trigonometric ratios by applying properties of similar triangles and use the results to find inaccessible heights and distances. Using the ratios of similar triangles to find unknown side lengths and angle measures, construct a physical model that illustrates the use of a scale drawing in a real-world situation.** |
| **M.O.G.3.12** | **apply the Pythagorean Theorem and its converse to solve real-world problems and derive the special right triangle relationships (i.e. 30-60-90, 45-45-90).** |
| **M.O.G.3.13** | **investigate measures of angles formed by chords, tangents, and secants of a circle and draw conclusions for the relationship to its arcs.** |
| **M.O.G.3.14** | **find angle measures of interior and exterior angles; given a polygon, find the length of sides from given data; and use properties of regular polygons to find any unknown measurements of sides or angles.**  Other Polygons and Polyhedrons Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=38>  Triangle Island  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=128> |
| **M.O.G.3.15** | **develop properties of tessellating figures and use those properties to tessellate the plane.**  Transformations/Tessellations 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=219>  Tessellation Lessons  <http://members.cox.net/tessellations/index.html>  Can You Create A Mutant?  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=3649> |
| **M.O.G.3.16** | **derive and justify formulas for area, perimeter, surface area, and volume using nets and apply them to solve real-world problems.**  Other Polygons and Polyhedrons Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=38>  Triangles & Circles Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=35>  Soft Drink Package Efficiency  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2557> |
| **M.O.G.3.17** | **apply concepts of analytical geometry such as formulas for distance, slope, and midpoint and apply these to finding dimensions of polygons on the coordinate plane.**  Parallel and Perpendicular Lines on a Coordinate Plane 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=216>  Hexagon Island  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=117>  Triangle Island  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=128>  Octagon Island  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=145>  Light Bounce  <http://illuminations.nctm.org/ActivityDetail.aspx?id=120>  Soccer Problem  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=158> |
| **M.O.G.3.18** | **construct a triangle’s medians, altitudes, angle and perpendicular bisectors using various methods; and develop logical concepts about their relationships to be used in solving real-world problems.**  Triangles & Circles Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=35>  IGD: Median  <http://illuminations.nctm.org/ActivityDetail.aspx?id=55>  IGD: Perpendicular Bisector  <http://illuminations.nctm.org/ActivityDetail.aspx?id=57>  IGD: Angle Bisector  <http://illuminations.nctm.org/ActivityDetail.aspx?id=49> |
| **M.O.G.3.19** | **create and apply concepts using transformational geometry and laws of symmetry, of a**   * **reflection,** * **translation,** * **rotation,** * **glide reflection,** * **dilation of a figure, and**   **develop logical arguments for congruency and similarity.**  Transformations/Tessellations 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=219>  Mirror Tool  <http://illuminations.nctm.org/ActivityDetail.aspx?id=24> |
| **M.O.G.3.20** | **compare and contrast Euclidean geometry to other geometries (i.e. spherical, elliptic) using various forms of communication such as development of physical models, oral or written reports.** |
| **M.O.G.3.21** | **approximate the area of irregularly shaped regions based on the approximations and the attributes of the related region, develop a formula for finding the area of irregularly shaped regions. Plan, organize and present results by justifying conclusions.**  Other Polygons and Polyhedrons Geometry 9-12  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=117&tsele3i=38> |

**Algebra 2**

**General**

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Resources Mapped to the WESTEST Item Analysis Mathematics Grade 10 SAS in School Curriculum Pathways

[http://www.sasinschool.com](http://www.sasinschool.com/)

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| **Grade 9-12** | **Mathematics: Algebra II** |
| **Standard 2** | **Algebra** |
| **M.S.A2.2** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **demonstrate understanding of patterns, relations and functions,** * **represent and analyze mathematical situations and structures using algebraic symbols,** * **use mathematical models to represent and understand quantitative relationships, and** * **analyze change in various contexts.** |
| **M.O.A2.2.1** | **determine equations of lines including parallel, perpendicular, vertical and horizontal lines, and compare and contrast the properties of these equations.**  Functions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=67>  Systems of Equations and Inequalities  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=69>  IGD: Perpendicular Lines  <http://illuminations.nctm.org/ActivityDetail.aspx?id=50>  IGD: Lines in Geometry  <http://illuminations.nctm.org/ActivityDetail.aspx?id=22>  Perpendicular Bisector  <http://illuminations.nctm.org/ActivityDetail.aspx?id=57>  IGD: Simson Line  <http://illuminations.nctm.org/ActivityDetail.aspx?id=56> |
| **M.O.A2.2.2** | **factor higher order polynomials by applying various methods including factoring by grouping and the sum and difference of two cubes; analyze and describe the relationship between the factored form and the graphical representation.**  Quadratic Equations over Real and Complex  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=68> |
| **M.O.A2.2.3** | **define complex numbers, simplify powers of ‘i’, perform basic operations with complex numbers, and give answers as complex numbers in simplest form.**  Quadratic Equations over Real and Complex  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=68>  Complex Numbers  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2556>  Million $ Mission  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=4330>  Powers of Ten  <http://www.sciencenetlinks.com/tools.cfm?DocID=18> |
| **M.O.A2.2. 4** | **simplify expressions involving radicals and fractional exponents, convert between the two forms, and solve equations containing radicals and exponents.** |
| **M.O.A2.2. 5** | **solve quadratic equations over the set of complex numbers: apply the techniques of factoring, completing the square, and the quadratic formula; use the discriminate to determine the number and nature of the roots; identify the maxima and minima; use words, graphs, tables, and equations to generate and analyze solutions to practical problems.**  Conic Sections  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=70>  Quadratic Equations over Real and Complex  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=68>  Exploring Parabolas  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=3283>  Proof without Words: Completing the Square  <http://illuminations.nctm.org/ActivityDetail.aspx?ID=132>  Minimax Principle  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=368>  QuickMath  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=423> |
| **M.O.A2.2.6** | **develop and use the appropriate field properties of matrices by adding, subtracting, and multiplying; solve a system of linear equations using matrices; and apply skills toward solving practical problems.**  Systems of Equations and Inequalities  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=69>  Airfares  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2364>  Call Me  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=4309> |
| **M.O.A2.2.7** | **define a function and find its zeros; express the domain and range using interval notation; find the inverse of a function; find the value of a function for a given element in its domain; and perform basic operations on functions including composition of functions.**  Functions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=67>  Spreadsheet and Graphing Calculator  <http://illuminations.nctm.org/ActivityDetail.aspx?id=38>  Damping Functions  <http://www.coolmath.com/dampfunction1.htm>  The Ten Centimeter Circle  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=1583> |
| **M.O.A2.2.8** | **analyze families of functions and their transformations; recognize linear, quadratic, radical, absolute value, step, piece-wise, and exponential functions; analyze connections among words, graphs, tables and equations when solving practical problems with and without technology.**  Functions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=67>  Damping Functions  <http://www.coolmath.com/dampfunction1.htm>  Airfares  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2364>  How Far Do I Travel? How Far Do I Go?  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2411>  Online Calculators  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=2078>  Variance: Excel  <http://www.mste.uiuc.edu/malcz/Spreads/VARIANCE-EXCEL.html>  Call Me  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=4309>  Spreadsheet and Graphing Calculator  <http://illuminations.nctm.org/ActivityDetail.aspx?id=38> |
| **M.O.A2.2.9** | **solve quadratic inequalities, graph their solution sets, and express solutions using interval notation.** |
| **M.O.A2.2.10** | **solve and graph the solution set of systems of linear inequalities in two variables by finding the maximum or minimum values of a function over the feasible region using linear programming techniques.**  Systems of Equations and Inequalities  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=69>  Latisha Develops an Investment Plan  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=4357>  Jurassic Oil  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=4358> |
| **M.O.A2.2.11** | **solve practical problems involving direct, inverse and joint variation.** |
| **M.O.A2.2.12** | **analyze the conic sections; identify and sketch the graphs of a parabola, circle, ellipse, and hyperbola and convert between graphs and equations.**  Conic Sections  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=70>  Algebra and Calculus Via Sketchpad  <http://mathforum.org/sum95/ruth/sketches/algcalc.sketches.html>  Exploring Parabolas  <http://illuminations.nctm.org/WebResourceReview.aspx?ID=3283>  Half Angle  <http://illuminations.nctm.org/ActivityDetail.aspx?id=157>  Hospital Location  <http://illuminations.nctm.org/ActivityDetail.aspx?id=156>  Circle and Hyperbola As Lighthouse Curves A Mathematical Droodle  <http://www.cut-the-knot.org/Curriculum/Geometry/CircleAsLighthouseCurve.shtml> |
| **M.O.A2.2.13** | **solve absolute value inequalities graphically, numerically and algebraically and express the solution set in interval notation.** |
| **M.O.A2.2.14** | **define a logarithmic function, transform between exponential and logarithmic forms, and apply the basic properties of logarithms to simplify or expand an expression.** |
| **M.O.A2.2.15** | **identify a real life situation that exhibits characteristics of change that can be modeled by a quadratic equations; pose a questions; make a hypothesis as to the answer; develop, justify, and implement a method to collect, organize and analyze related data; extend the nature of collected, discrete data to that of a continuous function that describes the known data set; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project numerically, analytically, graphically and verbally using the predictive and analytic tools of algebra (with and without technology).**  Quadratic Equations over Real and Complex  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=118&tsele3i=68> |
| **M.O.A2.2.16** | **describe and illustrate how patterns and sequences are used to develop recursive and closed form equations; analyze and describe characteristics of each form.** |

**Trigonometry**

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| **Grade 9-12** | **Mathematics: Trigonometry** |
| **Standard 3** | **Geometry** |
| **M.S.T.3** | **Through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics, students will**   * **analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships,** * **specify locations and describe spatial relationships using coordinate geometry and other representational systems,** * **apply transformations and use symmetry to analyze mathematical situations, and** * **solve problems using visualization, spatial reasoning, and geometric modeling.** |
| **M.O.T.3.1** | | **apply the right triangle definition of the six trigonometric functions of an angle to determine the values of the function values of an angle in standard position given a point on the terminal side of the angle.**   * **determine the value of the other trigonometric functions given the value of one of the trigonometric functions and verify these values with technology.** * **using geometric principles and the Pythagorean Theorem, determine the six function values for the special angles and the quadrantal angles and use them in real-world problems.** * **compare circular functions and the trigonometric function values to draw inferences about coterminal angles and co-functions.**   Definitions and Equations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=390> |
| **M.O.T.3.2** | | **convert angle measures from degrees to radians (and vice versa) and apply this concept to**   * **create a data set, analyze, and formulate a hypotheses to test and develop formulas for the arclength, area of a sector, and angular velocity and use the formula for application in the real-world.** * **compare and contrast the concepts of angular velocity and linear velocity and demonstrate by graphical or algebraic means relationship between them and apply to real-world problems.**   Definitions and Equations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=390> |
| **M.O.T.3.3** | | **using various methods, basic identities and graphical representation**   * **verify trigonometric identities** * **prove the sum and difference to two angles, double-angles, and half-angle identities**   Definitions and Equations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=390> |
| **M.O.T.3.4** | | **justify and present the solutions of trigonometric equations that include both infinite and finite (over a restricted domain) solutions.**  Definitions and Equations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=390> |
| **M.O.T.3.5** | | **find the value of the inverse trigonometric functions using special angle trigonometric function values and technology.**   * **draw inferences of restricted domain to recognize and produce a graph of the inverse trigonometric functions.** * **prove conjectures made about the solution of the equations such as x = sin (arcsin y), x = sin (arcos y) being sure to consider restrictions of the domain.**   Definitions and Equations  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=390>  Graphs of Trigonometric Functions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=201> |
| **M.O.T.3.6** | | **identify a real life problem utilizing graphs of trigonometric functions and/or the inverse functions; make a hypothesis as to the outcome; develop, justify, and implement a method to collect, organize, and analyze data; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project using words, graphs, drawings, models, or tables.**  Graphs of Trigonometric Functions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=201> |
| **M.O.T.3.7** | | **model periodic data sets using graphs, tables, and equations and use them to analyze real-world problems such as electricity and harmonic motion.**  Graphs of Trigonometric Functions  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=201> |
| **M.O.T.3.8** | | **investigate real-world problems within a project based investigation involving triangles using the trigonometric functions, the law of sines and the law of cosines, justify and present results.**  Solving Triangles  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=205> |
| **M.O.T.3.9** | | **develop and test a hypothesis to find the area of a triangle given the measures of two sides and the included angle or the measures of three sides (Heron's formula) and use these formulas to find total area of figures constructed of multiple shapes.**  Solving Triangles  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=205> |
| **M.O.T.3.10** | | **express complex numbers in polar form:**   * **perform operations including adding, subtracting, multiplying, and dividing;** * **evaluate powers and roots of complex numbers using De Moivre's Theorem; and graph complex numbers.** * **graph complex numbers in the polar coordinate plane and make conjectures about some polar graphs and real-world situations such as the paths that the planets travel.**   Complex Numbers and Polar  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=392> |
| **M.O.T.3.11** | | **create graphical and algebraic representations for performing vector operations and analyze these to solve real-world problems such as force analysis and navigation.**  Solving Triangles  <http://wveis.k12.wv.us/Teach21/public/Iguide/Iguide.cfm?tsele1=2&tsele2=120&tsele3i=205> |

**Multiple Grade Levels**

**Grades PK-2**

**Algebra**

Creating, Describing, and Analyzing Patterns to Recognize Relationships and Make Predictions: Making Patterns

<http://standards.nctm.org/document/eexamples/chap4/4.1/index.htm>

**Geometry**

Investigating the Concept of Triangle and the Properties of Polygons: Making Triangles

<http://standards.nctm.org/document/eexamples/chap4/4.2/index.htm>

**Geometry/Problem Solving**

Developing Geometry Understandings and Spatial Skills through Puzzle like Problems with Tangrams: Tangram Puzzles

<http://standards.nctm.org/document/eexamples/chap4/4.4/index.htm>

**Number and Operations**

Learning about Number Relationships, Properties of Numbers Using Calculators and Hundred Boards: Displaying Number Patterns

<http://standards.nctm.org/document/eexamples/chap4/4.5/index.htm>

**Connections**

Developing Estimation Strategies by Making Connections Among Number, Geometry, Measurement, and Data Concepts: Estimating Scoops <http://standards.nctm.org/document/eexamples/chap4/4.6/index.htm>

**Grades 3-5**

**Number and Operations**

Communicating about Mathematics Using Games: Playing Fraction Track

<http://standards.nctm.org/document/eexamples/chap5/5.1/index.htm>

**Algebra**

Understanding Distance, Speed, and Time Relationships Using Simulation Software

<http://standards.nctm.org/document/eexamples/chap5/5.2/index.htm>

**Geometry**

Exploring Properties of Rectangles and Parallelograms Using Dynamic Software

<http://standards.nctm.org/document/eexamples/chap5/5.3/index.htm>

**Data Analysis and Probability**

Accessing and Investigating Data Using the World Wide Web

<http://standards.nctm.org/document/eexamples/chap5/5.4/index.htm>

**Geometry/Problem Solving**

Developing Geometry Understandings and Spatial Skills through Puzzle like Problems with Tangram Puzzles

<http://standards.nctm.org/document/eexamples/chap4/4.4/index.htm>

**Grades 6-8**

**Number and Operations**

Learning about Multiplication Using Dynamic Sketches of an Area Model

<http://standards.nctm.org/document/eexamples/chap6/6.1/index.htm>

**Algebra**

Learning about Rate of Change in Linear Functions Using Interactive Graphs: Constant Cost per Minute

<http://standards.nctm.org/document/eexamples/chap6/6.2/index.htm>

**Geometry**

Learning about Length, Perimeter, Area, and Volume of Similar Objects Using Interactive Figures: Side Length and Area of Similar Figures

<http://standards.nctm.org/document/eexamples/chap6/6.3/index.htm>

Understanding Congruence, Similarity, and Symmetry Using Transformations and Interactive Figures: Visualizing Transformations

<http://standards.nctm.org/document/eexamples/chap6/6.4/index.htm>   
Understanding Congruence, Similarity, and Symmetry Using Transformations and Interactive Figures: Visualizing Transformations

#### <http://standards.nctm.org/document/eexamples/chap6/6.4/index.htm>

Understanding the Pythagorean Relationship Using Interactive Figures

<http://standards.nctm.org/document/eexamples/chap6/6.5/index.htm>

**Data Analysis and Probability**

Comparing Properties of the Mean and the Median through the use of Technology

<http://standards.nctm.org/document/eexamples/chap6/6.6/index.htm>

**Grades 9-12**

**Algebra**

Great Reference : Hotchalk Videos

<http://www.hotchalk.com/mydesk/index.php/math-matters/387-math-matters-offroad-algebra>

**Number and Operations**

#### Learning about Properties of Vectors and Vector Sums Using Dynamic Software: Components of a Vector: This example illustrates how using a dynamic geometrical representation can help students develop an understanding of vectors and their properties

#### <http://standards.nctm.org/document/eexamples/chap7/7.1/index.htm>

**Modeling**

Using Graphs, Equations, and Tables to Investigate the Elimination of Medicine from the Body: Modeling the Situation

<http://standards.nctm.org/document/eexamples/chap7/7.2/index.htm>

**Ratios**

Understanding Ratios of Areas of Inscribed Figures Using Interactive Diagrams

<http://standards.nctm.org/document/eexamples/chap7/7.3/index.htm>

**Least Squares**

Understanding the Least-Squares Regression Line with a Visual Model: Measuring Error in a Linear Model

<http://standards.nctm.org/document/eexamples/chap7/7.4/index.htm>

**Problem Solving**

Exploring Linear Functions: Representational Relationships

<http://standards.nctm.org/document/eexamples/chap7/7.5/index.htm>